



A

PROPOSAL

To Determine our

LONGITUDE



(Price bound Four Shillings.)

PROPOSAL
To Determine our
LONGITUDE.

BY
JANE SQUIRE. K

The SECOND EDITION, in English only.



12 Ce

L O N D O N :

Printed for the **AUTHOR**, and sold by **S. COPE**,
at the *Bible*, in *King-Street* near *Golden-Square*;
and by the Bookfellers of *London* and *West-*
minster. 1743.

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PROPOSAL

To Determine our

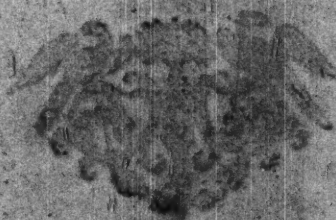
LONGITUDE

BY

MUSEVM
BRITAN
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JANE 22

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LONDON:

Printed for the AUTHOR, and sold by S. CORN-
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minster. 1742.



GLORIA

IN EXCELSIS

DEO,

ET

IN TERRA PAX

HOMINIBUS BONÆ VOLUNTATIS.



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ALBION

1890

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P R O P O S A L

To DETERMINE our

L O N G I T U D E.

TH E Knowledge of our Longitude and Latitude, enables us always to give a distinct Account on what Part of the Terrestrial Globe we are.

But, before it is possible for us to do this, after a Storm, in an open Sea, where nothing but Water and the Heavens are to be seen; we must be made, very well acquainted with its Form and Dimension; and the Relation of every distinct Part of it, to those Celestial Signs God has appointed to be visible to us from every Place.

The first of these, implies knowing so much of the Ratio of a Sphere as to determine the Proportion of every Circle of Latitude; as they decline from the Equator to each Pole.

The other, to have so much of Astronomy and Cosmography; as to be able, thence, to know the Time of the Day where we are: and consequently, at any nam'd Place.

In order to make this easy, it is absolutely necessary to adjust our Terrestrial Degrees to be an exact

Parallel to our Celestial; and to let it regulate all our other Measures.

: And to know, in these general Measures; the Longitude of the Degree upon each Circle of Latitude: the Difference of which, obliges to the strictest Observance of our Latitude; else a small Error in Latitude, may become a great one in Longitude; by giving us a false Measure to count it by.

○ After which, if our Latitude Celestial as well as Terrestrial be counted from the Equator; and the same first Meridians be consented to: it will remove a Multitude of Inconveniencies we at present labour under.

✱ And beginning our Account of Longitude, at *Betlehem*; and in that Part of the Heavens, which was zenithal to it; at the Time our Lord Jesus Christ vouchsafed there to be born for us: will indulge our Christian Gratitude, and by fixing our Æra of Place with that of Time; facilitate the Calculation of all Observations from it.

∴ And then, if by the correct Measure of our Degree; the Longitude and Latitude of every considerable Part of the known World, especially Sea-Ports; are adjusted: it will be made easy to introduce such a Parallel, as will render Astronomical Observations certain; and practicable to every common Sailor: and without this, all the Encouragement that can be offer'd to discover the Longitude; amounts to nothing, but an absolute Refusal of it when discovered.

Δ This Parallel, is propos'd to be given; in such a Delineation of the whole Terraqueous Globe, as shall imprint an Idea and give a Name and Character to every Point of it; and the same Name and Character, to their several Zeniths in the Celestial Concave: (meaning such as are so, when the
first

first Celestial Meridian is exactly over the first Terrestrial:) these Names and Characters, all to remain as a Mosaick Work; on which the first Stars, and Geographical Figures are to be disposed: whereby their real Place will always be express'd;) and easily remember'd: and thereby, the Course and Velocity of all Bodies moving between the Celestial and Terrestrial Parallels determin'd.

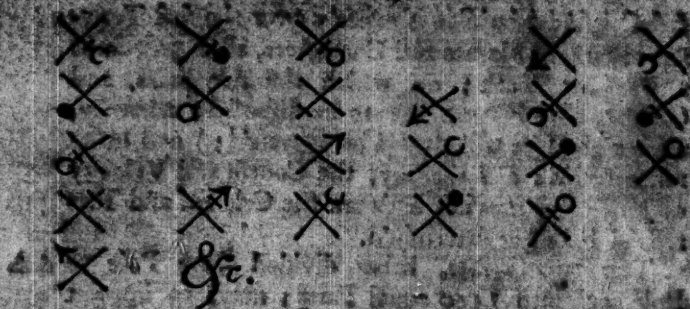
The two Globes, being divided from Pole to $\Delta\Delta$ Pole each into 1440 equal Parts; may, to imprint an Idea of their Form; as being 15 Miles in the Equator; and from thence gradually decreasing till all become extinct in each Pole be called Cloves of Longitude: and express'd by the Character $\ominus$ in General, and the Particulars be distinguish'd by the Names and Characters following.

First reserving from the Alphabet, D, C, and M; $\Delta\Delta$ to denominate Tens, Hundreds, and Thousands; the Unites may be call'd Ba 1, Fa 2, Ga 3, La 4, Na 5, Pa 6, Qua 7, Ra 8, Sa 9; the Tens Da 10, De 20, Di 30, Do 40, Du 50, Dia 60, Duc 70, Dui 80, Duo 90; the Hundreds by Ca 100, Ce 200, Ci 300, Co 400, Cu 500, Cua 600, Cui 700, Cui 800, Cuo 900; Thousands by Ma 1000, &c. compounding these, and disposing them, in their several proper Places; always omitting Cyphers, as in Macodo; 1440.

Which may be express'd by the Characters



The



- Δ. The Globes again divided, by the Equator, and by 359 North and 359 South Parallels to it; gives 720 Parts: which, to imprint an Idea of their Form; may be called Rings of Latitude: and expressed by the Character $\odot$ in general.

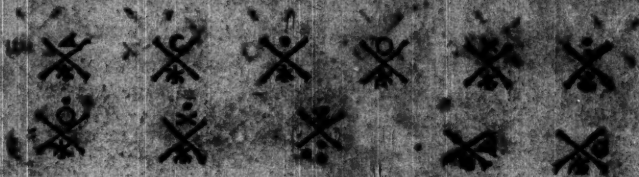
∴ Distinguishing the Particulars on each Side the Equator, by the same Names as are given to the 360 first Degrees of Longitude; with the preceding Addition of Tan or Tss, to express North or South; and consequently Latitude.

The Characters expressing them, may be the little Figures

Δ C ∴ ∅ × ∴ ∅ × ∴

1 2 3 4 5 6 7 8 9

placed in the Voids of the same Cross; as bears on its Points the Characters of Longitude: the Uaine, being always placed opposite to the Star; which at the Top expresses South, and at the Bottom North Latitude.



(9)



The Intersections, of these two Divisions; cut the Δ Surface of each Globe into 1,036,800 Parts; which may be called Cards, and expressed by this Character ∇ in general: each particular Card being distinguished by the repeated Names, and compound Characters, of the Clove and Ring that intersect each other in it: as Ba-Tanba, Da-Tanda, Ca-Tanca, Macodo-Taucidua.



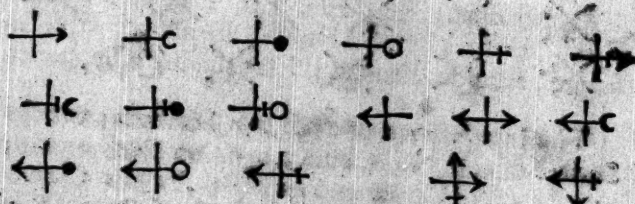
The Card is $\frac{1}{2}$ of a Degree in Longitude, and $\frac{1}{4}$ of a Degree in Latitude: which in the latter, is always 15 Miles; but differs in the former, according to the Ring it is upon: its Intention is, always to mark the first Distinction of Place; whether in Astronomical, Geographical or Nautical Observations; which is signified, by either its Name or Character.

In its Divisions, more particularly to determine our Place; to avoid giving the same Expressions to Space that are given to Time: the Names of Mile or Gradua (for by either is meant the 4th Part of a Degree, be that what it will) Mildua, Mia, Mindeu, Pin, Pindua, are used instead of Minutes, Seconds, &c.

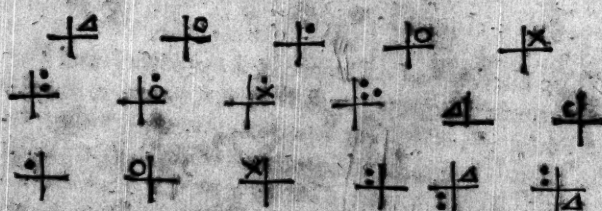
Which are expressed by the Characters, V, X, Z, Δ , δ , J, S; and the Particulars distinguished by the Names and Characters following.

V, Miles; Vx, Vc, Vi, Vo, Vu; Vua, Vuc, Δ , Vui, Vuc, Vuu; Vada, Veda, Vida, Veda, Vuda; Va-yuda, Yuda-va.

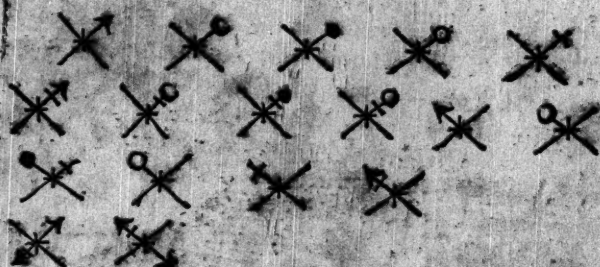
(16)



△: X, Milduas; Axa, Axe, Axi, Axo, Axu; Axua, Axue, Axui, Axuo, Axuu; Axuuda, Axuude, Axuudi, Axuudo, Axuudu; Axa-axuudu, Axuudu-axa.



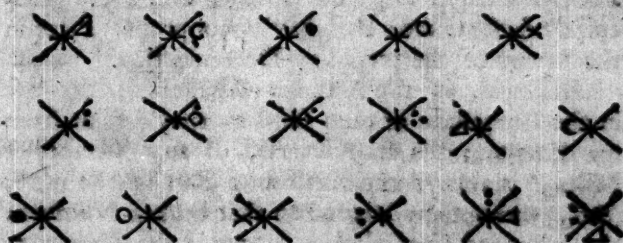
ci Z, Mins; Za, Ze, Zi, Zo, Zu; Zua, Zue, Zui, Zuo, Zuu; Zuuda, Zuude, Zuudi, Zuudo, Zuudu; Za-Zuudu, Zuudu-za.



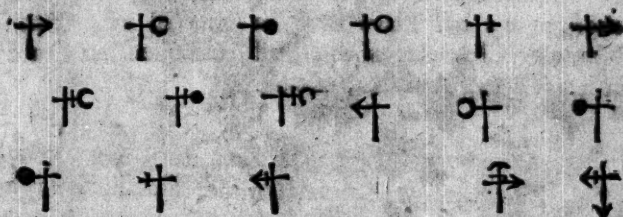
Ze, Mins

(11)

&, Minduas ; Eta, Ete, Eti, Eto, Etu ; Ettua, C ▲
 Etue, Etui, Etuo, Etuu ; Etuada, Etuude,
 Etuudi, Etuudo, Etuudu ; Eta-etuudu, Etuudu-eta.



J, Pins ; Ja, Je, Ji, Jo, Ju ; Jua, Jue, Jui, C G
 Juo, Juu ; Juuda, Juude, Juudi, Juudo, Juudu ;
 Ja-juudu, Juudu-ja.



S, Pinduas ; Sa, Se, Si, So, Su ; Sua, Sue, Sui, C
 Suo, Suu ; Suuda, Suude, Suudi, Suudo, Suudu ;
 Sa-suudu, Suudu-sa.



16

CO It may not be improper here to remark, that Va-va expresses no other square Mile but that in the Corner a $\frac{2}{3}$ of any Card or Square of Miles : Axa-axa the same in any square Mile, &c. every particularly denominated Part having its proper Place in the Square of the preceding Denomination.

CX And that, as the Number of Miles &c. decrease in the Longitude of each Card as they decline from the Equator; the least Excess, of any Number of Miles; is always expressed as a Part of the next: (tho', without any Regard to that broken Number; the following Card always begins in the Corner a, with Va-va, and goes on, with that first Mile of Longitude through its whole Latitude a—o, with the Longitude proper: as suppose the Top of a Card a—e to be one Mile, one Min, and that a Ship anchors at e; her Place must be mark'd, by first the Name or Character of the Card; and then her Place in it: Ve-va, Axa-axa, Ze-za.



C: Now, when the exact Dimension of every Card is given; if the Wake of the Ship gives the Course, and the Log-Line the Distance run; true; a Ship, sailing from a Port whose Longitude and Latitude is exactly adjusted, may, if she should meet with no Storm; without any Help from Astronomical Observations, always know her Place; by strictly noting the Card, and distinct Part of it she comes from; where she quits it, and enters the next; how she traverses that, and proceeds: which either writ down or mark'd in the Characters, is her Place; without any farther Calculation.

And

And this Manner, of keeping always a nominal cō Account of our Place ; must enable us more distinctly to remark all that may be of future Service

I would not here be thought to forget to look up c x to the Heavens, I know we there have our proper Day and Night and every Part of them mark'd out to us ; and that of any other Place, and consequently the Correction of all our absolute Time-Tellers ; when we exactly know the Distance between the first Celestial and the first Terrestrial Meridians : or any other Parallels, for all are equally distant ; or, as must happen once in every twenty four Hours ; altogether zenithal to their several Parallels.

Which Time, cannot be too strongly remark'd : c: and if, by Bells or any other Sound ; a general Notice of it were appointed to be given : all the World, might so be taught to know their proper Parallel ; and consequently, their Longitude.

For when the Stars are all known by their Places . i in the several Cloves of Longitude, and our Geography rectify'd by a Degree parallel to the Celestial one ; we may always know our Longitude, whenever we see the Stars : So that, could we all (like the Presbyter) see them in the Day, as well as by Night ; they would, by our Time ; tell us our Place : and considering the Manner, in which this Defect (we would sometimes, so gladly borrow) is accounted for ; and the great Improvement of the present Age in Opticks : I see not why, such a Glass may not be made ; as would give us this Advantage.

However, with or without it ; it is much to be . Δ wish'd, our Seamen were all directed to observe the fixt Stars in such a Manner chiefly as seems natural to their Purpose : as, to know how many Stars are on each several Clove of Longitude, (which at a Medium is not three) on what Rings of Latitude they

they fall; the compound Names and Characters of which; gives the Names and Characters of the Cards they are upon: and consequently, to those that want no more of their History; the Names of the Stars, in their proper Longitude and Latitude: for the Number of Cards, being above 300 Times as many as we have Stars in any Catalogue; we need not expect, to find a Multiplicity of Stars in the same Card; but if we should, the Divisions given, have abundantly provided for the minutest Distinction of their Places.

.C Were therefore our Seamen all taught (only by the Names of the Cards they are found upon) readily, by heart, to run over the Names of every Star; in every Clove of Longitude and Ring of Latitude: these double Repetitions, would imprint and confirm the Idea of their Local Distinction so strongly in their Memory; that it would be scarce possible for them ever to forget it.

.. And, directing them always to make their Observations in these Parallels; and in Hemispheres where the Conjunction of all the Cloves are to be seen in either Pole, exactly to mark the Pole itself; by a strict Observance of all the Stars in each Ring round it: tracing them through their several Cloves down to the very Horizon, where they find their Latitude; will keep perpetually in their View the exact (at least) Night-dial, God has there given us; every Clove of Space, answering to a Minute in Time.

,O And every Star, being thus known by its own particular Name; which (to the meanest Capacity) expresses its Place, both in Longitude and Latitude: must keep their Minds much more intent on their Business, than observing them only in Constellations; which unavoidably fill their Heads with foreign Ideas, and lead them out of their Way.

And

And such a general Parallel Ground-work being $\times$ laid, would soon determine the Course and Velocity of all moving Bodies in the Heavens; adjust the Ratio of the Phenomenon, between real and apparent Place; and give us, a distinct and ready Direction to the most minute Part of the Earth; equally intelligible over its whole Surface.

As every Square of Mosaic-Work, contains 3,600; lesser Squares; each distinguish'd, by a numerical Name and Character expressing its Longitude and Latitude, and consequently its Place: a Circle, drawn in any of these Squares; gives in the Chords of its Segments (all which are mark'd in the Mosaic-Work round it) the Diameters of the Circles of the same Denomination: which, divided by the Ratio of the Diameter of a Circle to its Periphery, and multiplied by the Ratio of the Periphery to the Diameter; gives the Longitude of the Circle: and every Circle, divided by 1,440; the Longitude of the Cards upon it.

The little Squares, intersected by the Periphery of, $\odot$ the Circle; may, by a Parallelogram have their Sections transposed to the Squares of which they were only the 3,600th Part; which will give their Fractions in the next Denomination of the Division of the Cards, &c. till we have all the Circles Vax-zet-jas: that is, in Miles, Milduas, Mins, Minduas, Pins, Pinduas; and as many Fractions, thence; as any Body cares to amuse themselves with.

But, as; supposing the Mile (as the 60th Part: $\times$ of a Degree) 2000 Yards: the Mildua, is only 100 Foot; the Min, 20 Inches; and the Mindua, a Barley-Corn; the Pin, a 60th; and the Pindua, a 36000th Part of that Barley-corn in Length: each Square Mindua, containing 12,960,000 square Pinduas: I see no Necessity, for any lower nominal Distinctions.

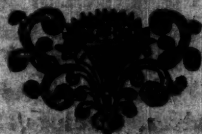
From

∴ From the same Method, we have the Contents ;
and consequently, in the Square-Root, of its lowest
Fraction; the Square of the Circle.

10 And by supposing our Squares Cubes; the Con-
tents of Solids; including the whole Ratio of a
Sphere: &c.

JANE SQUIRE.

P. 3. When the exact Longitude and Latitude,
of any Island, &c. (far distant from the Continent)
is known: may it not be of Service, to place on it
in some conspicuous manner; the Character of the
Card it is found upon: to distinguish it from others
of the same Resemblance?



COPIES

COPIES
OF
LETTERS

Written and Received by

JANE SQUIRE,
IN

Consequence of the preceding PROPOSAL.

To the Right Honourable the Lord Viscount
TORRINGTON.

My Lord,

IT is some Months since I took the Liberty of
sending to your Lordship a Proposal to deter-
mine our Longitude, which consisted chiefly in
the Introduction of such a Parallel between our
Convex and Concave Spheres; as was calculated
to render Astronomical Observations practicable
to any Person of common Capacity.

The Manner of Observation it proposes, I have
endeavour'd to explain, by an Astral Clock; I
have

have given Directions for, to Mr. *Heath* Mathematical Instrument-Maker in the *Strand*.

It is certain, that when our Astronomy and Geography are brought to an exact Parallel; the comparing the Astral or absolute Time, with our Solar or proper Time; must give us our Longitude: But to this Purpose, it is absolutely necessary to keep a minute and exact Account of each separately; whence, I cannot but hope to find; that it is to the confounding astral Time, with equated solar Time; and not sufficiently remarking that every Year has one more astral Day than it has solar Days; that we may chiefly attribute our Want of true artificial Time-tellers: and not to an Impossibility of making them.

I need scarce (to Lord *Terrington*) observe the great Celestial Helps we have to count our Solar or proper Time, and the Difficulty (not to say Impossibility) of making Instruments to know it by, without them: Nor the comparatively little ones (being only as the daily Advance of the Sun, Moon, a Planet, or Satellite in its own proper Orbit; to the Revolution of the whole Heaven) we have, to count Astral or absolute Time: which is incomparably more easy to be given by Instruments, being always equal.

But since this is not unknown, it is surprising to find the Abundance of Instruments we have to give Solar Time; and the entire Disuse of any to give Astral.

The many growing Advantages, which apparently must, naturally attend a general Knowledge, and ready Comparison of the Astral or absolute Time; with our Solar or proper Time: makes me earnestly wish, that the Return of that Parallel between our concave and convex Spheres (which by a Reference to their several Distances
from

from *Betlehem*, and its Zenith; at the Time our Lord *Jesus Christ* chose to be born there for us: gives a distinct Name to every individual Point in each, and Commencement to the Astral Day;) might, by a Speaking-Trumpet from the Top of a Church, or some other appointed Place; be always proclaimed in the Words of the Angel who brought us the glad Tidings, all our Era's join to commemorate: (Glory be to God on high, and on Earth Peace to Men of good Will) and called our *Pax*.

The Time honour'd, as that in which our Lord was born; being that of the Winter Solstice 1732 Years ago: it then being Midnight, at *Betlehem*; its Zenith, must be in that Meridian which cuts the Equator exactly between the preceding and the following Winter Solstice.

This Parallel, therefore, beginning the Account both of our Celestial and Terrestrial Longitude; takes its Name from the first Consonant with the first Vowel of our Alphabet, Ba: And the opposite Part of the Heavens, where the Sun then was, and the Terrestrial to which it then gave Noon, by being Zenithal; (according to the Division of the Globes, each into 1440 Cloves of Longitude) must be Cuedeba: each Clove, Celestial and Terrestrial as then parallel; taking the proper numerical Name that belongs to the Place they were then in.

Thus, if *London* be just $41\frac{1}{2}$ Degrees from *Betlehem*; its Solar Time was then nine Hours and fourteen Minutes past Noon: and consequently, the Clove of Longitude it now stands upon, and that Celestial one, then Zenithal to it (retaining always the same Names they thence took) are Maceduena: and so of all the other Parallels.

If your Lordship will be so good as to let me know your Thoughts on what I have proposed, or would give me an Opportunity to explain my self further: a Line directed to me, at my House on the Bank-side, over-against *Somerset-House*: will be sure to come safe to

My LORD,

Your LORDSHIP's

Most humble Servant,

Decemb. 24. 1731.

JANE SQUIRE.

P. S. Writ in the Cover of the Letter.

Tho' the Correction of any Mistake either in our Astronomy or Geography seems mutually to lie in each other; yet I have writ to Mr. *Heath*, about a little Instrument, which if it answers; must adjust all our Parallels with much more Certainty and Expedition: and also, about two little Water-Engines; to give our Longitude and Latitude separately: which appears to me the best Method of measuring the Way of a Ship independent of Astronomical Observations: Tho', could the Wake of a Ship be observed in all Weather to give our Course; one fix'd Wheel might give our Distance run, but with a great deal of Trouble; to reduce all the several little Distances run on every different Direction, to such an exact Order; as to give us our Longitude and Latitude.

Second

Second Letter to the same.

MY LORD,

I Can have no Doubt, but your Lordship must have received the Letter I myself left at your House; I confess I am extremely mortified at receiving no Answer to it.

The Proposal, it inquired after; I sent only to your Lordship, and such others as I found nam'd with you in the Commission by the Act of Parliament; which appoints you Judges of all Proposals of this Nature.

As I look'd on this Act, as the Voice of *Great Britain*; calling to all the World for Help to discover the Longitude: I thought I might without any Impertinence, offer my Thoughts on that Subject; to those whom so great an Authority directed me to.

I have been told, that desirable as this Discovery is; it will be accepted from no Hand but one: to whom, the Proposals of all are to be given, that he may thence be better enabled in a certain appointed Number of Years, to compleat what he has promised.

It is impossible to read the Names, of the Commissioners appointed by this Act; and believe such an Order can be given by them: because, it would be the highest Injustice to all that offer the Assistance it desires; and consequently, destroy its Intention: which is generously and publickly to reward the Labours it encourages, and not secretly to determine them to be sacrificed, to the Honour and Interest of one; who, (by having him-

self undertook to make this Discovery) is certainly disqualified to be the sole Judge of the Methods by which others propose it: could one be constituted in the Room of so many?

In a full Dependence therefore, my Lord, that there cannot be any such Order as directs me where I should say nothing; I take the liberty to observe to your Lordship, that the Preamble to that Act of Parliament takes notice of several proposed Methods to discover the Longitude; true in Theory, but difficult in Practice; amongst them, I doubt not, but that by the Theory of the Moon, is meant one.

Permit me my Lord to say, there can be no Reason why it is not practicable as well as true in Theory; but because our Astronomy or Geography, or both, want a Correction.

I know we boast the utmost Perfection in the first, and have even idoliz'd a Name we think we owe it to; but it still remains a strong Objection against our Astronomy, that it yet enables us not to find our Longitude.

If the Theory of the Moon as given by that great Author would have determined it; sure it must have been, in his own Hands: But since his Attempts there were vain, I see not why we should depend on it thence from any other.

It is not consistent with the reasonable Limits of a Letter, to add all that may be objected against our Astronomy; but the simple easy Method I have proposed making Observations in, will (if ever put in practice) be found to shew them and their Correction together.

And *Ephemeris's* made thence, to tell us exactly the Place of every moving Body in the Heavens at the Commencement of every Astral Day; as
found

found amongst the fixed Stars (without any particular regard to the Zodiack) will soon make Celestial Observations more serviceable to Navigation (where Astronomy only, and not Astrology is necessary) than they at present are.

As the Intention of these *Ephemerides*, is purely Astronomical and not Astrological; there will be no necessity to find the Sun's Place always in the Ecliptick, nor the Places of the Planet in the Zodiack: But, if the Precession of the Equinoxes be; (as it seems) really prov'd: in a Parallel, to the first Ecliptick; at the same Distance its Equinox is from the first Equinox: for a Precession of the Equinoxes, must prove the Course of the Sun a Spiral; from its first Motion still going on in its unfinish'd Path: and annually in it, making those parallel Tours that give us our Summers, Winters, and Days of different Lengths in their appointed Seasons.

And if the Nodes of the Planets, are found to have the same precessive Motion; their Courses must also be sought, each in its proper Spiral.

I am,

My LORD,

With much Respect,

Your Lordship's

Most humble Servant,

Decemb. 24. 1731.

JANE SQUIRE!

LETTER III.

To the same.

MY LORD,

THE great Rewards offered at different Times, and in different Places; to those who shall discover the Longitude: sufficiently inform us, that it is judg'd a General Good.

Why then, may it not be accepted from any Hand?

It is not new, to owe great Discoveries to those we could least expect them from: God, from whom alone we have all useful Knowledge; often correcting the Pride of human Wisdom, by permitting the Simple to find; what the Learned have over-look'd.

The Impossibility (or at least almost insurmountable Difficulty) pronounc'd against this and some other Problems, can I think, imply no more; than that they are not solvable, by the Rules establish'd in our School: And consequently, seem naturally, now to call for some unskilful Hand; which not being bound by those Authorities, dares boldly cut the *Gordian* Knots assunder; and reduce them to our Use.

Who, bred in Mathematick Schools; dares contradict Opinions, which to admire, is to be wise; and to idolize, is to excel in Wisdom? Yet by blindly adhering to them, we must for ever deprive ourselves of the only certain Method to
know

know our Longitude; which is, by comparing the Absolute with our Proper Time.

We are far from doing this, when by an Astrolabe, we observe the Return of a Star to our Meridian; and having added or subtracted the Sun's Equation proper to the Day, call it our Solar Day; as if the Sun's Equation, were the only difference between the Astral and the Solar Day.

The Difference between the Astral and Solar Day is, that Arch of the Equator intercepted between the Meridian the Sun is upon, at the Commencement of the present Astral Day; and that it was upon, at the Commencement of the preceding one.

That ever-altering Arch, therefore, being added to our always equal Astral Day; gives our different Solar Days.

But by counting our Astral Day, or the Return of a Star to our Meridian, equal to the equated Solar Day; we give it near 4 Minutes too much Time, which must occasion a daily Error in Longitude of near a Degree; which under the Line is 60 Miles, and tho' decreasing on every Ring, as they decline from the Equator to each of the Poles; yet is always considerable, wanting very little of 4 Cloves, or Cards, be we, where we will.

It need therefore no longer be a Surprise, we have our Longitude no better; but that we have it so well; since we count our absolute Time so ill: But as it is an Error prov'd as soon as pointed out, it cannot continue; and the inestimably correct Catalogue of fixt Stars, which our Astronomers
are

(26)

are still daily encreasing for us; observ'd in a Manner natural to our Purpose: will then soon give us our Longitude, to whatever Degree of Exactness we know our Solar or proper Time; which is I believe more than ever was, and all that ever can be expected. I am,

My LORD,

YOUR LORDSHIP'S

Most humble Servant,

March 8. 1731-2.

JANE SQUIRE.

LETTER IV.

To Sir *Thomas Hanmer*, Baronet, one of the Commissioners for the Longitude.

SIR,

SINCE I am told by you that the Commissioners appointed by Act of Parliament Judges of all Proposals to determine our Longitude, never have met; nor intended to meet, till summon'd upon a Likelihood of Success: (the judging of which Likelihood, you seem to think too unreasonable a Trouble to charge any Person or Persons with;) I less wonder I have received no Answer from Lord *Torrington*, to the Letters I writ to him, as the first-named in that Commission.

But

But I am inexpressibly surpris'd to find a Commission of this Nature, constituted by our whole Legislature ; thus render'd utterly inaccessible.

You, Sir, are almost the only surviving Commissioner expressly named as a Commissioner for Life ; That, and your having had the Honour to preside as Speaker of the House of Commons when this Act of Parliament was pass'd ; made me think its Intention must naturally have fallen under your Protection.

It is true, I am told by all ; that yourself and your Doctor *Halley*, are the only acting Commissioners ; or rather he alone, by your Favours : I doubt not but you remember the Objections, I in my second Letter to Lord *Torrington*, make to such a Reference : however, I have by the strongest Interest I could make, endeavour'd to prevail with him to say the Proposal I have offer'd is, or not worthy the Consideration of the Commissioners : but to no Purpose.

But Sir, if the Commissioners have never yet met ; how can this sole Power not only of judging, but of acting in this Discovery ; which Doctor *Halley* takes to be his so undoubted Right and Property, have become so ?

I hope it is not owing to your acknowledging this Right, that you said you are not Judge enough of Navigation, to see of what Service my Studies may be to it ; but that they can certainly never serve myself farther than as an Amusement.

Again, if the Commissioners have never yet met, who has judg'd of that great Number of Proposals offer'd to their Consideration ; and pronounced them so trifling and ridiculous, as to exclude all future Proposers, from any Right to be heard or consider'd ?

I cannot

I cannot express the Surprise, nor yet avoid naming it to you here; it gave me to hear you (after having with you so much Patience and Attention, took the Trouble to read over the printed Proposal, my three Letters to Lord *Torrington*, Mr. de *Moiure*'s Letter to me, with the Opinion of his nameless Friend; and my Answer to it) say, without taking the least Notice, of what was in any of them; I had no reason to resent either from Lord *Torrington*, or any of the other Commissioners (to each of whom I had six Months before sent a printed Copy of the Proposal) that I had received no Answer; because they were all long ago weary with receiving trifling and ridiculous Proposals from others.

You may Sir remember, I then told you; it appeared to me, that the Act appointing these Commissioners gives me (as having took the Trouble of printing a Proposal to determine our Longitude, sent a printed Copy of it, to every Person I found by the Act constituted Commissioners; each at his proper dwelling House: and afterwards writ three Letters to the first-named Commissioner, whom I supposed to preside as Chairman or Chief of the Commission; inquiring after, and explaining it:) a Right to be told by them, or some acting publicly under their Authority; that what I had so propos'd was trifling, ridiculous, or otherwise; which I still insist upon; for no Words, let them be spoke in what manner, and by whomsoever; can weigh enough, to make me believe myself answerable for the Triflings or Ridiculousness of others.

I therefore, then press'd you to name the particular Objections you found against what I had propos'd; upon which you fixed upon an Assertion

tion I make in my third Letter to Lord *Torrington*, as the most formidable: To convince me of my Mistake, you recommended to me, the reading of Doctor *Gregory's* Elements of Astronomy and Geography; and I begg'd you would bestow a few Minutes Recollection on the Assertion itself, in order to convince you I was not mistaken in it.

Thus we parted; the Assertion was intended to detect a generally receiv'd Error, by which we seem to have lost our Longitude; and thereby recover or discover it: and is, by accounting our Astral Day or the Revolution of the Heavens equal to our Equated Solar Day; We give it almost 4 Minutes too much Time, which occasions a daily Error in our Longitude of near a Degree.

As this Error (tho' generally received and taught) seemed to me prov'd, as soon as pointed out; I could not have imagined it impossible for you to reach Home, in the Opinion you then profess'd; that the equated Solar Day and the Astral Day were equal: The Difference between the Astral, and our Solar Day, being only the Equation; had I not a Fortnight after been told, you continued in the same Sentiment.

The finding you, Sir, who really know Astronomy so well; continue so long in this Opinion: convinces me more than ever, how absolutely necessary an *Eclaircissement* it is, to make the absolute or astral Time, as generally and as well known, as our solar and proper Time; and the Comparison of them, familiar even to Children: and I take the Liberty to inclose you a few Lines I have copy'd from the Preface of the *Geneva* Edition of Doctor *Gregory's* Elements, whose Authority will I hope engage you to bestow the few Minutes Consideration I had in vain desired; and thereby

thereby convince you, that the Assertion, was no Mistake in

SIR,

Your most humble Servant,

January 10, 1732-3.

JANE SQUIRE.

P. S. It seems to me very easy to demonstrate the Longitude, if it is desired; but impossible to determine, whether it be really desired or no.

LETTER V.

To the same.

SIR,

THIS asks pardon, for having in my last desired an Answer, and not giving my Direction; which is to me at my Lodgings, the Ring and Pearl in *Coventry-street*, near *Panton-square*.

I cannot help taking this Opportunity, of answering two Objections I hear are made; not against the Proposal I have made, but against my making such a Proposal.

The first is, that Mathematicks are not the proper Study of Women.

The Term Mathematick, I with great Ease resign to the Men; but to count, to measure, &c. which are now generally suppos'd to be included in it; are so naturally, the Properties of every reasonable Creature, that it is impossible to renounce them, and deserve that Honour.

I must

I must add, that this overvalued Science, seems to me the lowest Business I have proper to me as such: Natural Philosophy, and every other Branch of useful Knowledge lying (by this advantageous Gift) as open to my Contemplation, as to that of the most Learned.

But what must be decisive; that I am not attempting to act above my proper Sphere; is, that my being a Woman, excludes me not from the Blessing of being a Christian; a Character that determines the Business of the reasonable Creature; by a Determination made by its Creator: which consequently, must be agreeable to its Capacity.

Hence, Sir, it has ever appeared to me; that to study the Law of God Day and Night, is my proper Business; Philosophy, my Amusement; and Mathematicks, my Play-things.

It is impossible to consider God as our Creator, Redeemer, and Sanctifier; and not be led into a thousand Branches of entertaining and useful Knowledge: for which Reason, it would be no Surprise to me; to find great Numbers of excellent Philosophers and Mathematicians that scarce know what the Word Mathematick means.

I do not remember any Play-thing, that does not appear to me a mathematical Instrument; nor any mathematical Instrument, that does not appear to me a Play-thing: I see not, therefore, why I should confine myself to Needles, Cards, and Dice; much less to such Sorts of them only, as are at present in Use.

The second Objection is, against my invading the Property of the Mathematicians, by pretending in case I should discover the Longitude, to be myself intitled to the Reward offered by Parliament.

To

To this, I must say; that the Act proposing a Reward to such as shall discover the Longitude, seems to me, not to limit its Discovery to any particular Person or Persons; nor even to have left the Commissioners a Power so to do: wherefore it appeared, and still appears to me; as fair a Prize, as any Plate given to be run for at *New-market* or elsewhere; the Pursuit more entertaining, the Victory more glorious, and the Attempt free to all; without the least Apprehension of encroaching upon the Property of any one.

This said, I have only to beg to know; if the Opinion of the Commissioners, or of any acting publicly by their Authority; may be had, and how; which will extremely oblige,

SIR,

Your most humble Servant,

Jan. 29. 1732-3.

JANE SQUIRE.

LETTER VI.

Answer by the Honourable Sir *THOMAS HANMER*, to Mrs. *Squire*.

MADAM,

YOUR second Letter has informed me how I may direct an Answer to you, in which I was at a Loss before:

Aa

As you are the first Person who has yet ever pressed for a Meeting of the Commissioners appointed for the assigning the Reward to the Discoverer of the Longitude, you have given me the first Occasion of turning my Thoughts that way and what occurs to them is this, that the Commissioners never will meet for the Purposes you seem to expect that is for receiving Proposals or Schemes of the first Impression which the Authors shall think fit to lay before them and judging upon them in a private Manner among themselves. To be sure that can never be the Work of a Chamber-Examination; it must undergo the Scrutiny of all the great Professors of the Sciences of Astronomy and Navigation, and not only that but it must stand the Test of Practice, it must come into general Use and be fully vouch'd by Experience before the Discoverers can be intitled to the Reward or any Share of it. Your Appeal therefore lies to the World, you must publish your Thoughts and if they carry that Demonstration which you think they do, Mankind will greedily receive them, the Advantages of such a Discovery will be too great to be stifled, nor will it be difficult afterwards to determine to whom the Merit and the Prize belong, that will be the Business of the Commissioners to enquire into and to decree and you need not fear but Justice will be done.

I cannot at this Distance of Time recollect the Terms of the Dispute at Mrs. *Duncomb's*, but this I know, that as you explain yourself now, I could not be of the Opinion you now charge upon me, so that we must have mis-understood one another before. What you assert now that the Sun doth not return to the same Meridian each Day with the same fix'd Star is no more

than that the Sun moves (apparently) in the Ecliptick and is one of the first Elements of Astronomy: I believe the Question as I took it before was that the Sun returns to the Meridian of the same fixed Star in the same Time one Day as another excepting the Inequality: taken Notice of in our common Tables of *Æ*quation.

I am,

MADAM,

Your very humble Servant,

THO. HANMER.

LETTER VII.

In Answer to the former.

SIR,

I Am extremely surpriz'd to find by yours, that I am the first Person that ever yet press'd for a Meeting of the Commissioners appointed for the Assigning a Reward to the Discoverers of the Longitude; and have thereby given you the first Occasion to turn your Thoughts that Way.

But, tho' I really desire the Meeting of these Commissioners; I beg to be understood, not now to press it, as the Assigners of the Reward; but as the Judges of all Proposals to that Purpose.

You tell me, what occurs to you is this; " That the Commissioners never will meet for the Purpose I seem to expect: that is, for receiving

" Proposals and Schemes of the first Impression
 " which the Authors think fit to lay before them;
 " and judging upon them in a private Manner
 " among themselves: to be sure that can never
 " be the Work of a Chamber-Examination; It
 " must undergo the Scrutiny of all the great Pro-
 " fessors of Astronomy and Navigation; and not
 " only that, but it must stand the Test of Prac-
 " tice; It must come into general Use, and be
 " fully vouch'd by Experience, before the Dis-
 " coverer can be intitled to the Reward or any
 " Share of it. You add that my Appeal therefore
 " lies to the World, that I must publish my
 " Thoughts, and if they carry the Demonstra-
 " tion which I think they do; Mankind will
 " greedily receive them; the Advantages of such
 " a Discovery will be too great to be stifled, nor
 " will it be difficult afterwards to determine, to
 " whom the Merit and the Prize belong; that
 " will be the Business of the Commissioners to
 " inquire into, and to decree; and I need not
 " fear Justice will be done.

Must I Sir, hence, conclude; that the Com-
 missioners absolutely resolve not to act as Judges,
 to examine the Merits of Proposals; but only as
 Assigners of the Reward?

Till such a Resolution is taken, I see not how
 my Appeal can lye to the World; and if it is
 took, is not all the Care and Consideration of the
 Legislature (providing proper Judges to examine
 Proposals, and a Fund to defray the Expence of
 Experiments) utterly evaded?

By it, every Proposer wou'd again be involv'd
 in almost all the same Inconveniences and Diffi-
 culties the Act propos'd to remedy; and conse-
 quently, it cannot subsist without the Commis-
 sioners act in a direct Opposition to the Intention of

the Act that constituted them such: Except the Act it self, have a real and an apparent Meaning; more difficult to reconcile, than that the real and apparent Place, &c. of any moving Body in the Heavens.

I cannot give you a stronger Instance, that I am not singular in the Opinion that Proposals and Schemes of the first Impressions may (not improperly) be given to the Commissioners; than by telling you that whilst the Proposal I afterwards printed, was only a Manuscript (not being able to procure the Act of Parliament) I ask'd the Advice of the Attorney-General, where to address it; who told me, to any one of the Commissioners, whose Names he read me out of the Act.

I therefore hope that, tho' what you writ me; was what occur'd to your Thoughts at that Time: that if you give yourself the Trouble to read over the Act of Parliament, you will change your Opinion; especially if you add to it, that of persuing the Inclosed.

To explain what I mean, by the Interest the Attorney General seem'd to take in the Discovery of the Longitude; it was by his readily giving his Advice, but positive refusing any Fee: saying, he regarded the Discovery of the Longitude as a publick Concern; and himself, as the King's Attorney: and as such, would only be paid by him.

I am,

SIR,

Your most humble Servant,

JANE SQUIRE.

LETTER VIII.

To Sir *Philip York*, Attorney General.

SIR,

HAVING the Misfortune to be extremely misfled by an Act of Parliament, I about a Year ago gave you the Trouble to read to me; on my asking your Advice where to address a Proposal to determine our Longitude: The Interest you seemed to take in this Discovery, as a general Good and a publick Concern; makes me take the Liberty to tell you the Difficulties I meet with, as a publick Grievance: which may, and I think must; attend as many as attempt it.

The Directions I understood you gave me, was to shew the Proposal to any one of the Commissioners the Act appoints Judges of it; I therefore took the Liberty to shew it to Sir *Hans Sloane*, who (as President of the Royal Society) is one.

He had Goodness enough at my Request to read it over, tho' he would not allow himself to be a competent Judge of a Proposal of this Nature being so deeply engaged in Studies foreign to it; and tho' he could not but own, I was in the right in asserting he was a Judge appointed by Parliament; yet that, he said, gave him no Title to judge alone; but only with the other Commissioners.

He then also told me, that the Commissioners he believed would insist on the Recommendation of some noted Mathematician; and particularly, that they had a great Deference to the Opinion of Doctor *Halley*: I had no Acquaintance with Doc-

tor *Halley*, nor any other Mathematician ; and was unlearn'd in their Schools, and which was worse ; unable to bow down to their Idols or subscribe to their first Axioms : My Intention was, to have propos'd teaching poor Sea-Boys by humbler Methods to count their Time, and thereby determine their Place ; which I could not hope would meet with the same Reception from the Professors of those Sciences, as appeared reasonable to expect from Commissioners appointed by Act of Parliament to encourage the facilitating of Navigation.

I was resolving, therefore to stop here ; when recollecting that I had not long before accidentally had occasion to see a very great Master in Numbers, who possibly would give his Opinion of this Proposal : I ask'd Sir *Hans*, if he thought that Opinion would have weight with the Commissioners ? and on his thinking it would, I apply'd to that Gentleman ; who readily took it to consider of, and agreed to give his Opinion, till he found the Subject upon which it was desired ; but then, he immediately declared ; he would not for a thousand Pounds read any thing relating to the Longitude : the Act of Parliament proposing a Reward for its Discovery, having made it charging himself with Money ; and that if two Persons should happen to think in the same Manner, and one of them acquaint him with his Sentiments ; he might be suspected, to have discovered it to the other ; however, if I printed it, he would be sure to read it ; but not till then : because, till then, the Property was unfixed.

He strongly recommended Doctor *Halley*, as the properest Judge ; being a Commissioner, an Astronomer, and a Sailor ; But I own with Sir *Hans*

Hans Sloane, to think the first gives him no Title to judge alone; and his having himself undertook to make this Discovery, makes it appear to me a Question whether he can have any, distinct from his Character of Commissioner: yet not to be thought to neglect so recommended an Opinion, I desired to know whether he himself cared to give it or no; and hearing nothing from him, I have concluded in the Negative; and without any further Application printed the Proposal: and in *August* last was twelve Months, sent one printed Copy to each Commissioner, and consequently one to *Dr. Halley* as such.

I also sent one to the Mathematician above mention'd, who after some Time sent me not his own Opinion, but that of a nameless Friend; which he said I might depend on, as well as upon his own: This Opinion and my Answer to it, I shew'd to Sir *Hans Sloane*; and told him how I had proceeded; He was so obliging as to say, he would himself endeavour to get me the Opinion of Doctor *Halley*; which he told me soon after was the same with that I had shewn him.

This I said surpriz'd me not, having always took that Gentleman's Friend for *Dr. Halley*; but I think Sir *Hans* was not of that Opinion.

About *Christmas* last, I writ to Lord *Torrington*, as first named in the Commission appointed by Parliament to judge of this Affair; to desire to have his Thoughts on what I had propos'd, or an Opportunity of explaining myself further.

I have writ since two other Letters to his Lordship, pursuant, &c. but have receiv'd no Answer to any.

As this whole Affair seems entirely refer'd to Doctor *Halley*, whose Opinion I cannot properly be said to have; in that of the un-named Friend

of another: which Opinion, I know not that Doctor *Halley* has ever seen: I took the Liberty again to trouble Sir *Hans Sloane*, and begg'd he would be so good as to use his Interest with Dr. *Halley* to get him to sign at the End of one of the printed Proposals, that it appear'd to him worthy or unworthy of the Consideration of the Commissioners; but though I am very sure Sir *Hans* has endeavour'd to procure me that Satisfaction, it is hitherto without Effect.

I have attempted also, to get the Opinion of several other very good Mathematicians; but they all say, they will not pretend to judge of Proposals which the Parliament has referred to a Commission appointed on Purpose.

If this Commission, who in near twenty Years have never thought fit to meet as Commissioners; nor that I can find, have appointed any Judge of the Probability, they expect to be summoned upon to meet: have (for fear of having any Proposal offer'd to their Consideration, which should be unworthy of that Honour) determin'd to receive none; it would be a charitable piece of Justice to inform the World of it, that this Act of Parliament may no longer remain the Destroyer of the most valuable of all Goods, Time: or if they have limited their Consideration to certain Persons or Conditions, not express'd in the Act, ought not these Limitations (if possible) to be made as publick as the Act itself? that all who are excluded the Honour of being heard may know it, and be silent; which should certainly have regulated the Conduct, and consequently would have prevented this Complaint, from

S I R,

Your most obliged Humble Servant,

Sep. the 15th, 1732.

JANE SQUIRE.

P. S. Without hoping that you will give yourself the Trouble to read them, I should take it as a Favour that you would permit me to lodge in your Hands a printed Copy of the Proposal, and Copies of the Letters I writ to Lord *Torrington*; because, a Time may come; when what is said may be as much regarded, as who says it; when I shall be ready to explain them fully, to the proper Judges.

LETTER IX.

To Mrs. *Squire*, at the Right Honourable
the Lady *Howard's* in *Red-Lyon Square*.

M A D A M,

MY Friend has told me that your Method of finding the Longitude chiefly consists in the three following Particulars: First, you suppose that the Course of the Ship may be exactly known, secondly the Distance run may be exactly known; and thirdly that these two Things being granted, it will follow that a Chart constructed by your Direction, the true Place of the Ship may be determined: but, Madam, give me leave to say that in all this, there is no more than is generally known, and that in order to some tolerable Guess towards the Place of the Ship, the Seamen keep their Course as well as they can, and also endeavour to know their Distance by the Log-line, but hitherto the Practice of these two Things has been so imperfect, that though it has been of some Use, yet the Result of this is very far from giving us the Longitude, and unless the
un-

unavoidable Errors arising from these Practices were corrected by celestial Observations, Navigation would be much more imperfect than it is ; I have one thing more to add, which is this, the Chart you describe is not the Chart that ought to be used, for the Proof of which, be pleased to consult any Book of Navigation, and to consider what is said about Mercators Sailing. I am with all Respect,

MADAM, .

Your most Humble,

and most Obedient Servant,

A. DE MOIVRE.

LETTER X.

To Mr. *De Moivre*.

SIR,

I Am obliged by your's, but cannot let Mr. *De Moivre* remain in his Friend's Supposition ; that the Method I proposed finding out the Longitude by, consisted in supposing the Course and Distance run sufficiently adjusted by the Wake of the Ship, and the Log-Line ; and consequently, by the Charts I have proposed, the Place of the Ship immediately (hence) known : It really being, by knowing the Form and Dimension of the Earth ; and the Relation of every distinct Part of it, to those celestial Signs, God has appointed to be visible to us from every Place : It is true, I have

have said ; if the Wake of a Ship gives the Course, and the Log-Line the Distance run true ; a Ship exactly knowing the Longitude and Latitude of the Port she came from, may if she meets with no Storm, by the proposed Method know her Place : but I say this, very well knowing the Log-Line to be only a random Guess ; which cannot answer to any tolerable Exactness : and that the meeting with no Storm, in a whole Voyage ; is never to be depended on : I hence therefore, immediately proceed to celestial Observations ; which I chuse to make from the fixed Stars : not only in Regard of their Number, and being dispersed over the whole Face of the Heavens ; but as they really appear to me, the most certain part of our Astronomy.

I will only add, that the determining our Longitude appeared to me rather impracticable, than undiscovered ; and my Proposal was only intended to reduce that to Practice, which all know to be true in Theory : Tho' we wanted the Advantages, this Knowledge ought to have given us ; by its being always proposed in a Manner, above the Comprehension of those, it was chiefly intended to instruct : the bringing it therefore to the Standard of a vulgar Capacity, and thereby rendering it of general Use ; was all aim'd at by,

S I R,

Your obliged humble Servant,

JANE SQUIRE.

As to Charts made agreeable to the Maps, they can (now) only answer exactly to a System that supposes the Earth a perfect Sphere ; being calculated upon that Supposition.

L E T.

LETTER XI.

To the Earl of *Berkeley*.

MY LORD,

SEing your Lordship's Name now among the Commissioners constituted by Parliament, for the Discovery of the Longitude by Sea; and for examining, trying and judging of all Proposals, Experiments, and Improvements relating to the same; the Authority of that Appointment, will, I hope make my Excuse; for the Liberty I take in sending you the inclosed Proposal.

The Act of Parliament constituting these Commissioners, supposes the Discovery of the Longitude a Good much wanted and desired; for the Safety and Quickness of Voyages, and for the Preservation of the Lives of Men: In Consideration of the Difficulty, &c. a publick Reward is (by it) settled as an Encouragement; for so useful and beneficial a Work: A publick Fund is by it charged with the Expence of such Experiments, as to the Commissioners, or a Committee of five or more of them shall appear worth the Trial; and the receiving and judging of all Proposals to this Purpose (I think) is, by it, referred to the Commissioners it appoints.

Nothing was further from my Expectation on seeing this Act, than to find that the Commissioners thus appointed near twenty Years ago; never yet had met as such: and to have Reason given me to apprehend, that they would never meet to examine and judge of the Proposals they receive; or to empower any Person or Persons, so to do: yet so it is.

I cannot

I cannot, my Lord, but hope that a Resolution, (which seems to me) so contrary to the Intention of the Act; so injurious to the Property, or at least reasonable Expectations of every Proposer; and even detrimental, to the Honour of a Commission constituted by our whole Legislature; cannot be took by all the Commissioners: and that therefore, it will not be long before (at least) a Committee of them meet to remove the Occasion of so just a Complaint. I am,

MY LORD,

YOUR LORDSHIP'S

most humble Servant,

Feb. 20. 1732-33.

JANE SQUIRE.

P. S. I should be very glad to lodge an Explanation of the printed Proposal in any Hand your Lordship would direct, or to explain it myself to any Person you would send to me; at my Lodgings, the Ring and Pearl in *Coventry-street*, near *Panton-square*.

LETTER XII.

To Sir John Jennings.

SIR,

YOUR being now a Commissioner, appointed by Act of Parliament for Discovery of the Longitude by Sea; and for examining, trying and judging

ing of all Proposals, Experiments and Improvements relating to the same; will I hope exempt me from Impertinence in sending you the inclos'd Proposal.

I have endeavour'd by a long Explanation, to show that an acute Exercise may as well (and I hope much better) teach Boys intended for Sea, as much Astronomy as is necessary for their Purpose, as the most intent Study; being dexterous, appearing to me a Qualification better adapted to their laborious Calling than being learned.

I confess to think that when our Astronomy, and Geography (which at present seem to me to want much Correction) are brought to a just Parallel, and an exact Account kept of the Astral or absolute Time and of our Solar or proper Time; each separately: Boys who can readily find their Zenith, and the elevated Pole; and compare their Solar with their Astral Time: will whenever they see the Stars, have both their Longitude and Latitude in view: Which may be doubly advantageous Southward, where their Compass is said but uncertainly to serve them.

A thousand Things occur, proper and even necessary to be said; were the Discovery of the Longitude really intended to be gone about: But if the Commissioners resolve to wait nine Years longer for a New Theory of the Moon, and after that eighteen more; the Examination whether it be, or be not preferable to those left us by Sir *Isaac Newton* or Doctor *Flamsteed*; before they consider of any other Proposal: I believe this wants only to be generally known, to save them the Trouble of receiving any.

But Sir, tho' I doubt not but this will be heard to, by some of great Influence; yet as the Commissioners have never once met, to make
any

any Resolution in form; I see not it can be accounted a general Resolution: and indeed there seems less Reason for such a Partiality, considering the Person from whom this Theory of the Moon is expected; is not by such an Application engaged in any Study foreign to his Profession: But be all this as it will, I doubt not but that were the Method I would propose, put in practice in any of our great Mathematick Schools; long before this Theory of the Moon be finished, it would be found absolutely unnecessary: for Boys whose constant Business it is, to trace Cloves of Longitude and Rings of Latitude, every Star-light Evening in the Heavens; and name every Star they see in them, by a Name which expresses its Place; must all see, and consequently know the Course of the Moon; &c. amongst them: and the whole Heavens being now divided into 1,036,800 Cards without any Voids between them, and those Cards into lesser Distinctions; they may by the Direction of the Stars, easily discern and name its Place.

Nothing seems more desirable to me, than to refer all I have said; and what I wou'd say further upon this Subject, to the Consideration of some of those great Masters who teach Boys Navigation, &c. at *Greenwich* or *Christ's Hospital*: But it is the Misfortune of every Thought on this Subject, not only by the greatest Authority, to be already referred to an inaccessible Commission; but that no Mathematician of Note, out of it, will pretend to give his Opinion of what the Parliament has appointed, Commissioners (so great and learned as those in it are) expressly to judge of; unless it be, by the Direction of some great Authority.

If

If therefore Sir, you (to whom it would be very easy) would be so good as to procure for me (to whom it would be impossible) such a Reference; the Effect, would I hope atone for the Trouble; and it would be esteem'd the greatest Obligation possible, by

S I R,

Your most humble Servant,

Feb. 24. 1733-4.

JANE SQUIRE

LETTER XIII.

To Sir *Charles Wager*, first Lord of the Admiralty.

S I R,

I T has often happen'd to me to be in Company where I heard Sir *Charles Wager* spoke of, in a Manner that seems to reprove me; for despairing of Justice from Commissioners among whom (as first Commissioner of the Admiralty) he has Precedence.

I cannot consider him in this Character, and imagine these Commissioners are to act in nothing but assuming a Right to dispose of all that is offer'd to their Consideration; (including the Property of every Proposer) to whom they please: because the Act, I think, gives them no such Power.

If it does, it certainly ought to be repealed; as injurious to Liberty and Property.

Be

Be Sir, so good as to tell me; must I take as the Resolution of the Commissioners, what has been writ to me by one of them; viz. "as you
 "are the first Person who has yet ever press'd
 "for a Meeting of the Commissioners appointed
 "for the assigning the Reward to the Discoverer
 "of the Longitude, you have given me the
 "first Occasion of turning my Thoughts that
 "way, and what occurs to them is this; that
 "the Commissioners never will meet for the Purpose
 "you seem to expect: that is, for receiving
 "Proposals and Schemes of the first Impression,
 "which the Authors shall think fit to lay before
 "them; and judging upon them, in a private
 "Manner among themselves: To be sure, that
 "can never be the Work of a Chamber Examination;
 "it must undergo the Scrutiny, of all
 "the great Professors in the Sciences of Astronomy
 "and Navigation; and not only that, but
 "it must stand the Test of Practice; it must
 "come into general Use, and be fully vouch'd
 "by Experience; before the Discoverer can be
 "entitled to the Reward or any Share of it:
 "Your Appeal therefore lyes to the World,
 "you must publish your Thoughts, and if they
 "carry that Demonstration which you think
 "they do; Mankind will greedily receive them:
 "the Advantages of such a Discovery will be
 "too great to be stifled, nor will it be difficult
 "afterwards to determine to whom the Merit
 "and the Prize belong; that will be the Business
 "of the Commissioners, to enquire after and to
 "decree: and you need not fear but Justice will
 "be done.

In sending a Proposal to the Commissioners, I acted by the Advice of Council; desiring to be directed by the Act itself: and expected it would

D

undergo

undergo the Scrutiny of the greatest Professors of Astronomy and Navigation in Them.

I look'd on them as the proper Judges; impower'd at a public Expence to make Experiments not suited to, nor reasonable for private Persons; and as Judges of the Experiments, they shall think fit to order to be made; and consequently of the Merit of the Proposal made to them; with Power to assign the Reward given by Parliament.

No Person that has one reasonable Thought to offer, upon this Subject; can unmortified find, such Commissioners so constituted, after 20 Years, have never once met and seem resolved never to meet for the Purpose they seem chiefly intended: and for which only such a Commission can be wanted.

It is now, Sir, in your Power, whenever you please, to remedy all this; therefore, in a full Confidence, that at some time or other, you will; you still by the Direction of the Act (as I think) have the Trouble of the inclosed from,

S I R,

Your most humble Servant,

March 8, 1733-4.

JANE SQUIRE.

P. S. If the Print I send with this, wants any Explanation; I shall willingly give it, if desired.

Directed to the Honourable Sir *Charles Wager*, as first in the Commission constituted by Parliament for the Discovery of the Longitude by Sea; and for examining, trying, and judging, of all Proposals, Experiments and Improvements, relating to the same.

LET.

LETTERS

WRITTEN

Since the Second Act of Parliament.

To Sir *Charles Wager.*

SIR,

A Second Act, being passed last Session of Parliament; to encourage the Discovery of the Longitude: convinces me our Legislature is still in the same Sentiment, as when the first was passed.

I cannot therefore now doubt, but that the Commissioners will meet to pay just Deference to that Act: when they do, as I am the only Person that has desired their Meeting as Judges, since the first Act constituted them such; may I not hope they will give themselves the Trouble to examine, what I have so long in vain offered to their Consideration? which would extremely oblige

SIR,

Your most humble Servant,

July 1. 1741.

D 2

JANE SQUIRE.

Second LETTER to the same.

S I R,

I Would willingly flatter myself, the Reason I have no Answer from you, must be because I did not in my Letter give you my Directions; (and 'tis possible your Servant might forget to tell you, that I desired to know when I might send for an Answer.)

The Errand therefore of this, is to tell you the omitted Direction; which is, To Mrs. Squire, at her Lodgings in *Chandler-street*; near *Grosvenor-Square*: Mr. Woodward's House.

As I have not given you this Trouble, but by the Directions of the highest Authority; it seems not me alone, but it; that is treated with Contempt: if the Simple (and from me, now, naturally consequent) question I have ask'd; be refused an Answer from you, to

S I R,

Your humble Servant,

July 4. 1711.

JANE SQUIRE.

To Sir Thomas Hanmer, Baronet.

A T the Close of the last Session of Parliament, an Act having passed for the Surveying

veying the chief Ports and Head-Lands on the Coasts of *Great Britain* and *Ireland* and of the Islands and Plantations thereunto belonging; in order to the more exact Determination of the Longitude and Latitude thereof: I cannot but hope, the Commissioners appointed by Parliament (in the first Act) will have so much Regard to this second; as (since they never thought fit to do it before) now for the first time to meet as such.

If they do, (as you Sir tell me I am the only Person that yet has ever insisted on their Meeting) may I not hope they will then give themselves the Trouble, to examine the Papers now for very near ten Years together offered to their Considerations by,

S I R,

Your most humble Servant,

July 16. 1741.

JANE SQUIRE.

An Answer from Sir *Thomas Hanmer*.

MADAM,

I Am sorry you apply to one so little able to give you Satisfaction upon the Subject of your Letter. I spend very little of my Time in Town, the Retirement of the Country suits better with my Time of Life as well as my Disposition of Mind, and I know very little what is doing eit her among the Men of Business or the Men of Learning

All I can say to the Disappointments you meet with when you address yourself to the Commissioners for the Longitude is this, that your good Sense I am sure will tell you that you are to expect to lye under some Prejudice upon account of your Sex. Man, arrogant Man, assumes to himself the Prerogative of Science, and when a Woman offers to teach them in any of the abstruse Parts of it they are apt to turn a disdainful Ear. To this Arrogance therefore, I believe you are to impute their Want of Attention to you upon this Occasion, and I have long despaired of finding the Cure of their Faults within the Power of

MADAM,

Your most obedient Servant,

July 27, 1741.

THO. HANMER.

To the Honourable the Board of Commissioners for discovering the Longitude.

GENTLEMEN,

HEaring you this Day intend to meet as Commissioners for the Discovery of the Longitude; to examine an Astral-clock,* offered to your Consideration by Mr. *Graham*.

I cannot help reminding you, that it is now ten Years ago since I proposed to you; first, to determine the Form and Dimension of the Earth; and all the several different Relations, of every distinct

* Which Astral Clock, I have been since told; gives only Solar Time.

distinct Part of its Surface; to those of the concave Heavens surrounding it: (including an entire new System of Geography and Astronomy,) and determining a first Meridian; in each: from which, our Longitude; Celestial, as well as Terrestrial; are to be counted: and also Astral Time; the Rule by which all Solar, Lunar, &c. Time must be measured.

To which Purpose, I propos'd that the making Instruments; Clocks and Watches, to give the Astral or absolute Time: which compar'd, with our Solar or proper Time; must (I think) always give us our Longitude: the Determination of which, seems to me greatly embarrassed, by making equated solar Days; the general Rule of Time.

As Gentlemen, you then seem'd resolv'd; never to act as Judges, of what appear'd to me, to be referr'd to your Consideration as such; by the Act constituting you Commissioners: I endeavour'd (to no Purpose) to find among our Clock and Watch-makers, one who would make me a Clock or Watch to give astral or absolute Time; (they not caring for the Trouble of directing Workmen to make Wheels, &c. in a Manner new to them.)

I was therefore oblig'd, myself, to seek a Workman I could direct; to execute all I direct'd: Whom I found in one *Du Chesne*, who I understood had made the musical Part of most of the musical Clocks of Note in Town.

I, with a great deal of Difficulty and Trouble; at last, made him understand all I intend'd; after which he was very earnest to be the first Maker of it.

I am told, this *Du Chesne* was the Person *r* *Graham* employ'd to make what I hear he now

calls his Astral Clock ; (a Name ridiculous whilst only used by me) tho' I cannot help apprehending, that the two Tables of Logitude, I sent to him (being desirous of engaging one recommended to me as the best Astronomer of his Profession to have made my Astral Clock) one by the late Mr. *More*, Engineer, unfortunately killed before *Cartagena*, and the other by Mr. *Graham* Member of the Royal Society ; with my Directions to *Du Chesne*, may make his Title disputable : But this, Gentlemen, you will be the best, as you are the proper Judges of it.

I sent a Copy of this Table of Logitude to Sir *Charles Wager*, as first Commissioner ; in 1732 : but as I have reason given me to apprehend, that (coming from a Woman) it is either thrown away, or given away ; I send another, with this, from,

GENTLEMEN,

Your most humble Servant,

Jan. 16, 1741-2.

JANE SQUIRE.

P. S. If my Measure of the Earth is (by the Power the Commissioners have hitherto asserted of disposing of the Property of all offered to their Consideration) given to Mr. *Whiston*, my Astral Time-tellers to Mr. *Graham* ; I must expect to see my System of Astronomy, made the Property of Doctor *Halley* ; but I cannot but think, if the Act constituting you Commissioners ; were now read at a full Board, it would prevent it.

Second

Second LETTER to the same.

GENTLEMEN,

WHEN I took the Liberty to trouble you with a Letter at your last, which was also your first meeting as Commissioners for the Discovering the Longitude (to claim my Property as the first Proposer of bringing Astral Clocks, Watches, &c. into general Use) I did not know of the Death of Dr. Halley. But since I find he really then was dead, who; (by the Power asserted by the Commissioners to dispose of the Property of every Proposal offer'd to their Consideration pretended a Right to them all) which as you Gentlemen, never had met to act or order as Commissioners (had the Act, extended your Power as such, so far:) I never could understand, and consequently acknowledge; tho' I found him all along actually supported in it by the only acting Commissioner, and tacitly by the first.

The Intention therefore of this, is to beg you will permit me to lay before you the Papers I have so long offered to your Consideration; before you again dispose of my Property in them: which will extremely oblige,

GENTLEMEN,

Your most humble Servant,

Jan. 23, 1741-2.

JANE SQUIRE,

Third

Third LETTER to the same.

GENTLEMEN,

MY last only begging you to permit me to lay before you the Papers I have so long offered to your Consideration (as my own) before you again undertake to dispose of my Property in them; I am entirely at a Loss, now to interpret your Silence.

What I have been told, was your Resolution; when I made my Application upon the passing of a second Act (at the Close of the late Parliament) farther to encourage the Discovery of the Longitude: I own gave me more Surprise than Mortification, when I heard it first; being, that a hundred Acts of Parliament should not oblige you to meet; and that tho' I should demonstrate the Discovery of the Longitude, as plainly as that it is Noon when the Sun is directly over our Meridian; I should be no better for it, except I would allow the late Doctor *Halley*, Doctor *Desaguliers*, Mr. *Whiston*, or some other Man, noted in Sciences; to propose my Scheme, as his own.

And I must confess, it appeared to me a Resolution so unworthy of Gentlemen, and *Englishmen*; that I was ashamed to ask (even yourselves) whether you had really made such a one or no? But, having accidentally an Opportunity of complaining of it to a Commissioner; who does not think fit to contradict it: I do not, now, see my self at Liberty to conclude there never was such a Resolution; unless you will tell me so.

However Gentlemen, your having since, once met as Commissioners; shews the first part of it no longer subsists: and I hope since you have met,

(59)

met, and probably may meet again ; the latter cannot long subsist after it.

If it does, I here take the Liberty to tell you ; I do not, nor ever will submit ; to what it proposes : to

GENTLEMEN,

Your most humble Servant,

Febr. 2, 1741-2.

JANE SQUIRE.

P. S. I cannot help adding this, that if my Property, to what I presented by the Directions of an Act of Parliament, be not thereby, secured to me ; at least I have the Honour to suffer, only, by what appears to me ; an Abuse of our whole Legislature : who want not Power to do me Justice when they please.



THE

THE
EXPLANATION
OF A
PROPOSAL
TO

Determine our LONGITUDE :

O R,

The LONGITUDE discover'd.

By *JANE SQUIRE*, 1731.

IT may possibly be asked, what Spirit of Impertinence provoked me to give new Names and Characters to all the Stars ; and a Name and Character to every distinct Place, on the Earth and in the Heavens ; as if, all were not sufficiently distinguish'd without them?

To which I must answer, it was not Impertinence but Necessity ; that obliged me to express and distinguish all Place in such a Manner as appear'd to me most agreeable to the Intention I was about : which was (if possible) to make every Inhabitant of the Earth, so well acquainted with its Form and Dimension ; and the Relation, of every distinct Part of its Surface ; to every distinct Part of the concave Heavens surrounding
2 it :

it : as to be able (thence) to count their Time ; and know their Place upon it.

• And add, that I neither pretend to give new Names to ; nor know the old ones of all the Stars : And therefore (having now distinguish'd all Place or Locitude upon each Sphere, by Names and Characters which signify each a particular Card or Square in Relative Measure ; (expressing its Longitude and Latitude, and thereby determining its Form and Dimension) I chose to distinguish them all, only by the Name of the different Place or Card each is found in ; with A, E, I, O, U, or Y ; (the Six several Significators of the Six different Magnitudes of the Stars distinguished in our Catalogues) put before it, to distinguish the Magnitude of the Star there placed : As our Nobility are distinguished, by the Name of the Place they take their Titles from ; a preceding Addition, always expressing the Title thence took.

○ If therefore, the fix Stars change their Places with regard to the Equator ; they must changing their Places change their Names : (all Names of Places, being given with reference to it ;) which will make it necessary, (or at least, proper) sometimes to have new Tables : giving the Names of the Cards, the Stars are removed to ; instead of those, they are removed from.

× But, if they remove only with regard to the Ecliptick (which is only the proper Orbit of the Sun ;) the Tables, once right adjusted ; remain so for ever : the Names of Place, whether Celestial or Terrestrial ; having no manner of Reference to it.

• The Necessity, of such a Distinction of Place ; appear'd to me, from the Confusion I always found
found

found in the Idea, and on the View of a Multitude of Stars; without any particular Names to distinguish them from each other.

Others, having such Names; as answer to no second Question I would ask about them: signifying nothing to the Purpose, of making Astronomy serviceable to Navigation.

Some of them, form'd into Constellations; ✕ most of which intend to commemorate what (I think) may as well be forgot: and some, not contained in any.

Constellations, bearing the Name of the twelve Signs of the Zodiack; but not to be found, in the Sign whose Name they bear; but in others.

Our Celestial Longitude and Latitude, counted from the Ecliptick and its Secondaries: and our Terrestrial, from the Equator and the Meridian of this, or that, or any Place.

And in short, what seemed to me; to amount to an universal Want of Harmony and Concotation: essentially attended with such Difficulties, Mistakes, and Perplexities; as render the Whole utterly unfit for my Use. ΔΔ

I resolv'd (therefore) at once, to deliver myself; from all these, and numberless other unnecessary Embarrassments; such as Azimuths, Amplitudes, Almacanthers, &c. giving an Infinite of different Names, to the same Celestial Place: as it, at different Times, refers to the Situation of moveable and moving Objects: Such as our Horizon, the Sun, &c.

And to seek out some, orderly Method; simply to distinguish, but strongly to form an Idea of the Nature of Time and Place; absolute and relative: and all their several Relations and References to each other. Δ.

That

△○ That by knowing an absolute Time, common to all the World ; and the Solar Time proper to the Place where we are : we may thence be able to determine, what Meridian ; as well as what Circle of Latitude, we are upon.

△× ☞ To this Purpose, I have introduced a Parallel between the Heavens and the Earth ; supposing them both to be fixed, upon the same Axis ; on which the first constantly makes its daily Rotations round the latter.

△: And, in that Situation (with Regard to each other) they may be supposed to have been in : at that great *Æra*, from which the whole Christian World now count their Time.

△○ Distinguishing, every correspondent Part of the Heavens and of the Earth in that Parallel ; as each Celestial, was then Zenithal to the several Terrestrial ; by one, and but one ; quite new Name : common to both, but distinguishable from each other (when that Distinction is necessary) by Cel. or Ter. put before the Locitudinal Name common to both ; as a Man and his Wife are distinguishable, by being the Lord and Lady ; or Master and Mistress of the same Place.

△× Which new Names, are not new for the Sake of being so ; but to avoid the Inconveniencies, obvious ; on using old Words in a new Sense : to be more expressive, and more concise.

△: Every one of these Names, signifying Locitude or Place ; expresses it, not as a Point, but as a Card, or Square (in relative Measure ; counting the same Longitude and Latitude : and in absolute, consisting of four equal Sides ; and four equal Angles ;) the first Repetition, of the Denominator of any Measure ; being always followed by a Numerator, or Numerators expressing its
Longi-

Longitude : and the second, by a Numerator
or Numerators expressing its Latitude ; not
as two, but one compound Name of Place :
as such, essentially consisting of Longitude
and Latitude.

Whence, the Name of every Card ; whe- c i
ther upon the convex Sphere of the Earth,
or in the concave of the Heavens ; always
expresses its Longitude and Latitude, as its
Locitude or Place : and consequently, deter-
mines its Form and Dimension ; both the
one and the other of them, always depend-
ing upon the Latitude of the Place it is in.

Distance, counted Eastward from the first c Δ
Meridian ; Celestial as well as Terrestrial :
is our parallel Longitude.

From their Secondaries, the Celestial and c c
Terrestrial Equators towards each Pole ; our
parallel Latitude : North and South.

And from both, our parallel Locitude ; c.
or Place in Longitude and Latitude.

Note, that by Meridian no more is here c O
intended but only a Semi-circle, reaching
from Pole to Pole and cutting the Equator
at right Angles : or rather, one reaching 90
Degrees due North and South from the
Center of the Sun's Body ; be it where it
will : always cutting the Equator at right
Angles, but not always reaching both Poles.

☞ The Æra, from which this Parallel c x
is taken ; naturally gives us, the Meridian of
Betlehem ; as our Terrestrial first Meridian ;
from the Place where, we received the Bless-
ing it commemorates.

And that parting *Gemini* from *Cancer*, c :
for our Celestial first Meridian ; from the

E

Time

Time when we received it : that being, the Winter-Solstice ; and Midnight, at *Betlehem*.

CO These first Meridians, allowed as such ; we (thence) immediately have an absolute Time : counting all its astral Days, Minutes, &c. (like the Equinoxes) by the Voice of the whole World ; in Concert.

CX Whence, it will be easy to say ; (from the proposed *Betlehem*-Tables) at such a Minute, &c. of astral Time, it will be Noon at *Betlehem* ; finding that it is Noon at that very Minute, &c. of astral Time, in the Place where we are ; we know, we must be ; upon the same Meridian with it.

C: Or, knowing we are upon that Meridian, and finding it to be Noon ; we thence know, the Minute, &c. of absolute or astral Time.

.1 And on any other Meridian, counting the astral Time, between Noon at *Betlehem* ; and Noon, at the Place where we are ; we must have our Longitude : which is always, that Distance counted Eastward ; from the first Meridian ; to that we are upon.

.Δ ☞ That the Computation of Time, by Place ; and Place, by Time ; may be rendered as easy as possible : the convex Sphere of the Earth, and the concave of the Heavens ; are both supposed to be equally divided by 1440 Meridians, into 1440 Cloves of Longitude : answering to the 1440 Minutes of Time, counted in every Day.

.C And that Latitude, may be counted by the same relative Measure as Longitude : each Sphere is again supposed to be divided, by its Equator and 359 North, and 359 South Parallels to it ; into 720 Rings of Latitude. Whereby,

Whereby, the 1440 Meridians; and the 720 Circles of Latitude, with the Equator (to which they are all Parallels) cutting each other at right Angles: divide the Surface of each Sphere, into 720 times 1440; or 1,036,800 Cards or Squares in relative Measure: whose Root from the Longitude of the Cloves, and the Latitude of the Rings, is a Quarter of a Degree.

☞ The Idea of 720 times 1440 Squares, whose Root is a Quarter of a Degree; being as applicable to the absolute Measure of a Square (or rather double Square) of 21,600 Miles in Length, and 10,800 in Breadth; as to the Area of a right Sphere: the Names of *Globe*, *Ring* and *Card*, (the Distinctions proper to relative Measure) are made use of here, to signify that Parts of the latter are intended.

The Content of each Card, (and consequently each Sphere) must be given in absolute Measure; with, and as measuring the relative proper to an exact Sphere; and all Place in each of them be so distinguished.

Relative Measure, gives to every Circle; great or little 360 Degrees; to every Degree, 60 Minutes; &c.

Absolute Measure, is here the Relative; proper to the Equator of our terraqueous Globe; and that of its proper Parallel the Celestial Equator: Each of which, gives us a Rule by which we can compare the Contents of its proper Sphere; and the Place, and Dimension, of every thing in and upon them: in absolute Measure.

E

Celestial

* Celestial absolute Measure, we however know not; but as the Parallel to our Terrestrial: whose Degree, Mile, &c. alters not from what it is found on the Equator, on any Occasion or in any Place upon Earth; but becomes the Rule, by which we measure the several Longitudes of every different Circle of Latitude; as they decline from the Equator to each Pole: and the Length, Breadth, &c. of every thing measurable.

∴ Measuring the Equator, or (in case the Earth be an exact Sphere) any other great Circle upon it, the Degrees, Minutes, Seconds, &c. are properly called so, as the 360th Part of a Circle, the 60th Part of a Degree, &c. in all relative Measure are.

○ I But considered as absolute Measure, measuring any other Circle; measurable Body; or Space; they must be distinguished by other Names: expressing the Quantity of Space contained in the Degree, Minute, &c. of the Equator of the Earth.

○ Δ  Relative Measure, measures the Time contained in every Day; on the Equator, and on every Circle of Latitude from it to each Pole; all of them being its Parallels.

○ c The Sun (in whatever Part of the Ecliptick it is) measures all its solar Minutes by the Cloves of Longitude; the Moon, its lunar; and every fix'd Star in the Firmament, the Minutes of the astral Day.

○ The last in absolute Time, the Rule by which we must measure every Solar, Lunar, &c. Day by; to know the different Excesses of each, above the 1440 Minutes of astral Time: always contained in, and completing the astral Day. All

All Astral Days being equal, and depending only on the Revolution of the Firmament ; are therefore always shorter than the shortest Solar, Lunar, &c. Day : the proper Motion of the Sun, Moon, &c. carrying them Eastward, and thereby retarding their Revolution Westward ; with and in the whole Firmament or revolving Sphere : which compleats their Day.

The Day therefore proper to every Luminary, (as its Revolution Westward) must be longer ; in Proportion to the Swiftneſs of its proper Motion Eastward : and the Latitude it is in.

The Velocity of every Luminary, determining the Length of its Days in General ; and the Latitude it is in, (by its Declination from the Equator, in its proper Ecliptick) that of every particular Day, proper to the ſame Luminary.

Whilst Absolute Measure, determines the real Quantity of Space ; each Luminary Measure, in each of its Minutes, &c. upon the Equator, and upon every Circle of Latitude declining from it to each Pole.

Latitude, being always counted upon the Parts of great Circles ; and here only upon Semi-Meridians ; reaching from the Equator to one or to the other Pole : The Degrees, &c. counted upon them ; are the ſame in Absolute as in Relative Measure ; as on the Equator.

By the Rings of Latitude, the Sun counts its Declination ; and conſequently, meaſures every Part of its Latitudinal Year.

As does the Moon, &c.

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By x1

✱Δ By the Celestial Card the Sun is found upon, and the Terrestrial it is Zenithal to at the Time of the Equinox; their Precession, may be determined: and consequently, the Year current known.

✱C And the same Observations made on the Moon, gives us its Locitudinal or great Year.

✱. The Parallel here given, between the Heavens and the Earth; and the fixt Stars all known by Names expressing their Longitude and Latitude: it is hoped, will make it so easy; to determine the real Place of the Sun, of the Moon, &c. and the Terrestrial Cards, they are Zenithal to; as will make it unnecessary to consult the Learned on that Occasion: The Place of every Planet, being thereby made obvious to all; as they trace their Course amongst the fixt Stars: which it is intended, may be done without much Art.

✱O A Precession of the Equinoxes being admitted, proves also a Precession of Solstices, and not only of the Solstices, but of the whole Ecliptick; as tracing the Sun's Course among the fixt Stars: Which I own, appears to me; rather an ebbing Spiral, than a fixt Orbit.

✱X And if the Sun's Course, really be; not a fix'd Orbit, but an ebbing Spiral; is it not plain, that that Luminary, cannot return to the same Locitude or Place in Longitude and Latitude; but by a Revolution of the Equinoxes: which according to the present Computation, cannot happen in less than 24. or 25000 Years? nor even then, unless the Precessions divide the Equator exactly

actly into equal Parts ; which we know, is not the Case of the Moon.

The Place of the Sun, and of the Moon, $\times$; and of every Thing placed or supposed to be placed in, or referr'd to ; upon either Sphere: must always be given in Cards, first bigger and then less, having their Place, Form and Dimension all determin'd, by their Names and the Tables giving the Proportion of a Sphere both in Relative and Absolute Measure.

Every Card measuring here a quarter of a $\times \circ$ Degree in Longitude and a quarter of a Degree in Latitude, they are all accounted as Squares in Relative Measure ; even in those Rings next the Poles, where in absolute they are very acute Triangles ; their Latitude being 15 Miles, and their Longitude not quite the 15th Part of one ; at the Top, and at the Bottom nothing ; being all extinct in the one or in the other Pole.

However, every one of these Cards, $\times \times$ contains 15 times 15, or 225 Cards of Minutes.

Every Card of a Minute, 60 times 60, $\times \circ$ or 3600 Cards of Seconds.

Every one of which 3600 Cards of Seconds, &c. all distinguished by different Names and Characters, expressing their several Longitudes and Latitudes ; which determines also their Form and Dimension as well as their Locitude or Place in the preceding Denomination of Cards: each Card, being one of the 3600 contained in each preceding Denomination of Cards ; (excepting the first) and containing 3600, of that following.

:Δ Now, tho'; with the Heavens and the Earth, all Spheres are supposed to be divided into 1440 Cloves of Longitude, 720 Rings of Latitude, and consequently into 1,036,800 Cards of Locitude or Places measuring $\frac{1}{4}$ Degree in Longitude and $\frac{1}{4}$ Degree in Latitude; which determines them Squares in Relative Measure; and that therefore, the Longitude of a Clove, the Latitude of a Ring, and the Root of a Card, when not distinguish'd to have any other Signification, are always suppos'd one Fourth of a Degree.

∴ Yet, the Name of Clove Ring and Card; have no manner of Relation to $\frac{1}{4}$ Degree; But what is given by the Division of a Sphere here supposed.

∴ A Clove, in it self; only signifying the Distance between two Meridians;

:O Ring, that between the Equator and any Parallel to it; or between two Circles of the same Latitude.

∴× And Card, a Square produced by the Interfection of Meridian Lines and their Secondaries the Equator and its Parallels: all placed at equal Relative Distance from each other.

:∴ The Equator therefore, with its Secondaries the Equinoctial and Solstitial Colures; divides each Sphere, into 8 Cards; whose Root is 90 Degrees.

:O 360 Meridians, with the Equator and 89 North and 89 South Parallels to it; into 64,800 Cards whose Root is a Degree in Relative Measure: But in absolute, they differ; having as many several Sizes, and Forms of Cards; as are counted upon each Semi-Clove: from the Equator to either Pole. No

No Division of the Globe into Cards, :✕ gives them all equal both in Absolute and Relative Measure but the Coracarda or Sphere divided into eight Cards; (which Cards, are also Semi-Cloves; which are always, all equal and similar; both in Form and Dimension:) and consequently, the same in Absolute as well as Relative Measure.

✎ Every Card or Corap, of the Coracarda; tho' accounted Squares, in Relative Measure; are in Absolute, exact Triangles; which sufficiently demonstrates, the Necessity of having Tables made; to give the Longitude, proper to every Circle parting the Rings of Latitude from each other; with the Equator; which, (it self being neither) parts the North from the South Circles, &c. in Absolute Measure.

From which Tables, all Circles of Longitude being Parallel to the Colures; and consequently, equal to the Equator: are the same in Absolute and Relative Measure. ○I

Absolute Measure, tho' here distinguish'd by different Names and Characters; yet (to facilitate Calculation) all retain the same Proportion (with regard to each other) that is found in Relative: Sixty, dividing and multiplying them all; into the next higher or lower Denomination of Measure. ○Δ

Which makes it unnecessary, for the Tables to express the Longitude in Absolute Measure of any other Relative: except that of the Circle, the Clove measuring the Minute of Time; and the Degree proper to the Circle: all the rest, naturally following; in Consequence of the Proportion preserv'd. ○C

- 8
 Ò. The Absolute Measure of the Equator, and consequently of all its Parallels; (all which may be adjusted, by the Directions given in the printed proposal Page the 10th) divided by 360, gives us the Degree proper to it; in the same Measure; and that divided by 4, the Clove.
- ÒÒ. The 360 Degrees, or 21,600 Minutes in Relative Measure; contained in every Circle: is on the Equator, 21,600 Miles; or Minutes in Absolute Measure.
- Ò× Fifteen of which Minutes, is the Measure of a Minute in Time; not as Absolute, but as Relative Measure: Every Luminary denominating Time, passing over a quarter of a Degree proper to the Circle of Latitude: it is found upon; in every Minute, of the Time it denominates.
- Ò: As therefore, the Minute of Time, measures 15 Minutes, of the Degree; on every Circle; measuring 15 Miles on the Equator, its Second must measure 15 Milduas; its Third, 15 Mins, &c. whence, we have the Measure of Space; answering to, every Denomination of Time: on that Circle.
- ÒÒ And as its Degree measures 60 Miles, its Minute must measure 60 Milduas, &c. whence, we have the Absolute Measure; contained in every several Denomination of Relative: on that Circle.
- Ò× And so on every Circle parting the Rings of Latitude; from this of the Equator (where Absolute and Relative Measure differ only in Name) to those only 15 Miles from the Pole: whose 360 Degrees, may be supposed to contain only 90 Miles; and consequently, their Card only 3 Milduas 45 Mins; and their Degree 15 Milduas; &c.
- The

The Top of the 1440 Cards, counted on $\odot$: those Rings; is, as in those of all others, the Measure of a Minute of Time, on the Circle parting it from the Ring above it; which being, 3 Milduas 45 Mins, the Second, must measure 3 Mins 45 Minduas, &c.

And its Degree being 15 Minduas; its $\times$ Minute, must be 15 Mins, &c.

In the measure, of a Minute of Time; $\times \Delta$ upon the Equator: we have the measure of the Top of the 2880 Cards found on the first North and first South Rings of Latitude.

And in that proper to, the first North $\times c$ and first South Circles of Latitude; their Bottoms, and the Top of the 2880 Cards found on the Second Rings of Latitude; North and South, &c.

Whence, knowing in Absolute Measure $\times$ as well as in Relative, the Longitude of the Top and Bottom of every Card; whose two Sides are always 15 Miles, as well as 15 Minutes Relative Measure; we may thence, easily compute the Content of any Card in Absolute Measure: which Content, may be added to our Tables; after the Longitude of the Circle, the Card, and the Degree of the Circle; which makes its Top.

The 2880 Cards found on the North and $\times \odot$ on the South Rings of Latitude, counting the same Declination from the Equator; having all the same Form and Dimension, must have the same Content: The Content, therefore; of one of the Cards, from each of the 360 Rings of Latitude found between the Equator and each Pole; added together makes

makes the Content of a Semiclove; which multiplied by 2880, gives the Content of the whole Area of the Sphere.

× × ∽ The Absolute Measure, by which the Longitude of every declining Circle of Latitude is here measured; being took from the Relative proper to the Equator of the Sphere it measures: the same Proportion, must be found in every right Sphere; measured by the Degree, &c. of its proper Equator.

× : If therefore, the Earth measured by the Degree &c. proper to its Equator, answers to these Proportions; its Form must be allowed, a Right Sphere.

× ○ If not, measuring by the Degree &c. proper to its Equator; first the Distance from Pole to Pole, as the Latitude of its Clove: then the several Longitudes, of the declining Circles of Latitude; we must (from thence) know, the Form and Dimension of its Cards; and if, and how, it differs from a Right Sphere: (the Proportions of which, are given in our Tables;) and at the same time, determine its real Form and Dimension.

× × The adjusting therefore, the Degree of the Equator of our Terraqueous Globe; (on which all our other Measures Absolute and Relative depend) is our Primum Mobile: without it, we can do nothing; every step we take, is in the Dark: and at best, but Guess-work.

× :: Till we know the Form and Dimension of the Earth, it is impossible to determine our Place upon it; and it is certain, we can know

know neither ; till an Absolute Measure (in this Degree) is determin'd.

Which Determination, demands the most :.1
exact and minute Account of Place ; both
in Absolute and Relative Measure : as it
is measured by the Sun, &c. on our Equa-
tor ; and on all its Parallels and Seconda-
ries.

¶ In order, to be able to express and :.Δ
distinguish all Absolute and Relative Space
and Time ; by Names significant and intel-
ligible to the lowest Capacity ; yet consistent
with the Conciseness here intended : it ap-
peared to me, absolutely necessary ; to a-
bridge the Names of Numbers : that so,
they might with more Conveniency and Sim-
plicity ; express the numerical Part of every
new Name proposed to be here given to the
several Parts of Space and Time absolute and
relative : Numbers affording the most natu-
ral and easy Distinction, and the strongest
Concatehation.

To this Purpose, as Letters are the least :.C
distinguish'd Parts of Words ; and nothing
is better known than the Alphabet : I have
(thence) accounted, in all the new Names
of Numbers ; &c. the Vowels A, E, I, O,
U, UA, UE, UI, UO, Numerators : to D,
the Denominator of Tens ; C, the Deno-
minator of Hundreds ; M, the Denomina-
tor of Thousands ; and MAM, the Deno-
minator of Millions.

And distinguish'd every several Unite, by :. .
a different Consonant Denominator ; put be-
fore the Vowel A ; whence we have Ba 1,
Fa 2, Ga 3, La 4, Na 5, Pa 6, Qua 7,
Ra 8, Sa 9. In

∴ ○ In which Unites, Tens, Hundreds, Thousands, and Millions; is an inexhaustible Fund of numerical Names: which put before or after the Denominators of Time and Place, relative and absolute; determines their Significations.

∴ × These Names, as proper to Numbers; I range in the common Order of Figures: expressing high Numbers as in them, Hundreds, Tens, Unites; Hundreds, Tens, Unites: expressing these Unites of Thousands or Millions; by M, &c. and Mam, &c. alternately till the Unite become simply such; and consequently, expressible only by the Name proper to it.

∴ × If a Triplet of Thousands or Millions, has no Unite, the Cypher in its Place must be expressed by the Denominator M, or Mam (as it signifies Thousands or Millions) without any Numerator: but if the Cypher be in any other Place, it is never expressed.

∴ ○ When a great Number of Cyphers, follow an expressed Number, the Millions only are expressed: as Mam-Mam-Mam, Millions of Millions of Millions.

∴ × And (the utmost Echassement being here intended) after a Triplet signifying Millions, a double Line thus —; and after one signifying Thousands, a single Line thus — may be put: to part the Triplets in high Numbers from each other.

∴ ∴ Tho' in Reality, these are Distinctions proper only to Figures; (as the Characters of Numbers) which without them, express not the Distinction their Names give; in Mam,

Mam, &c. or M, &c. or in Mam alone, or M alone.

☞ In counting Minutes, Seconds, &c. $\Delta 11$ of relative Measure; the Names of Units (and if wanted the Names of other Numbers) become Denominators: counted with the Numerators, a, e, i, o, u, ua, ue, ui, uo; with or without da, de, di, do, du: its Minutes therefore are Baa, 1 Minute; Bae, 2: &c. to Bauodu: Its Seconds Faa, 1 Second; Fac, 2; &c. to Fauodu, &c.

The Names of these Minutes, &c. ha- $\Delta 1\Delta$ ving t put between the Denominating Number, and the Numerators following it: expresses the Minutes; Seconds, &c. of Time: as Bata, 1; Bate, 2; &c. to Batuodu, 59 Minutes of Time: which from Bata, a Minute of astral or absolute Time: may become Solbata, a Minute of Solar Time; Lubata, a Minute of lunar Time, &c.

The Number of Minutes, Seconds, &c. $\Delta 1C$ to be expressed, never exceeding 59: Units in their Names, is always put before the Tens, as Bauodu, 59 Minutes in relative Measure; sixty being a Degree: Bauodu, 59 Minutes in Time; 60 being an Hour, or Degree in Time; called here Grata.

Bat, Fat, Gat, &c. without any Num- $\Delta 1$. rators following them; signifies once, twice, thrice, &c. and Ban, Fan, &c. the first, the second, &c. Bar, one Day: Barn, the first Day; Bant, the first Time, &c.

In all relative Measure, particularly in that $\Delta 10$ giving the several different Parts of our terraqueous and celestial Spheres; Cloves of Longitude, whether such as are between the

four Meridians making the equinoctial and the solstitial Colures, or such as measure Hours, Minutes, &c. (as Cloves) are all counted Eastward from the first Meridian: and each denominated from the Number it counts, Ba, Fa, Ga, &c. Ban, Fan, Gan, &c. the Meridians dividing them taking the Names of Banfolina, Fanfolina, &c.

Δ1x The Sphere we are delineating upon, being first described; and the Number of its Cards determin'd and expressed in a Denominator: as, Celcoracarda, the celestial Sphere divided into eight Cards: (which must necessarily be the 2 Colures and the Equator) Cards, being Squares in relative Measure; which always count their Longitude from the first Meridian; and their Latitude from the Equator: Tercocedura, the terrestrial Sphere; divided into 288 Cards, or Squares in relative Measure; which (as such) must begin to count, their Longitude from the first Meridian: their Latitude from the Equator: and consequently, divide the Sphere by 24 Hour-Lines: intersected by the Equator, and 5 North and 5 South Circles of Latitude; to give that Number of Cards: But a Sphere expressed to be divided into Cards, without determining the Number of Cards it is divided into; as Cocarda: is always supposed to be, by 1440 Meridians; intersected by the Equator, and 359 North, and 359 South Parallels to it; into $1 = 036 - 800$ Cards.

Δ1: As the Number of Cloves, is always double to the Number of Rings; the Number of Cards, upon every Sphere; must always be the Double of some Square Number:

ber: the Square therefore; of half the Number of Cards, upon any Sphere; is always the Distance from Pole to Pole: and the Equator, and all its Parallels counting the same relative Measure; (by which all Time is measured) double that Number.

Rings of Latitude, are also denominated $\Delta 10$ from the same Names of Numbers; but to distinguish them from Cloves counting Longitude, Ta, the Denominator of Latitude; determined by N or S, to signify North or South Latitude; is put before the numerical Part of the Name of every Ring of Latitude: as Tanba, Tanfa, &c. Tasba, Tasfa, &c. or rather Tanban, Tanfan, &c. Tasban, Tasfan, &c. and the Circles dividing them, are expressed and distinguished by the Names, Tancircaban, Tancircasfan, &c. Tascircaban, Tascircasfan, &c.

Cards, expressing Locitude; (or Place in $\Delta 1 \times$ Longitude and Latitude) must therefore be denominated from a Clove, and from a Ring; the whole Surface of the Sphere, being always contained in the Cloves; and also all, in the Rings whatever their Number be: each therefore, gives to the Card, the Name proper to the Place it is in: the Clove, as its Longitude; and the Ring, as its Latitude; which together, express its Locitude; as Ba-Tanba, &c. Ba-Tasba, &c.

The Significators of celestial and terrestrial $\Delta 1 ::$ al, North and South, and those distinguishing solar lunar, &c. from astral or absolute Time; are never expressed but once: and that, always, before the first Distinctions of Place or Time; the same Distinctions, being naturally understood to be in every low-
F er

er Denomination ; all really being, but Parts of that first given.

△△I

The Denominators of Minutes, Seconds, &c. in every Card ; are (however) always twice repeated : first with a Numerator, expressing its Longitude ; and then, with one expressing its Latitude ; which together, are its Locitude ; or the Place, of every lesser Card ; in every bigger : not as two, but one compound Word ; no Distinction of Place, being given in more than one ; after the first : which generally consists of two compound Words ; as Cel-coracarda, Ba-tan ; having place in the first Clove of Longitude, and in the Ring of North Latitude ; of a celestial Sphere divided into eight Cards : Baa-baa, or rather Baan-baan ; the first Minute in Longitude, and the first in Latitude ; Faa-faa, the first Second in Longitude, and the first in Latitude, in a Minute-Card : Gaa-gauodu the first Third in Longitude, and the 59th in Latitude, in the Card of a Second, &c.

△△△

Thus, the Denominator of every Card gives its relative Dimension ; and the Numerators determine its Place ; in the next bigger Card : which at the same time, must specify its Form ; because, all Place (here) gives Names which express, not only its Situation but Quantity : every Name of Place, must therefore ; give the Form and Dimension, of the Card it signifies ; as well as its Longitude and Latitude : the two first, being always dependent upon the fourth.

△△C

⚡ The Denominator of Latitude, upon the Equator ; (not being inclined either North or South) is only Ta : which is varied

ed by the preceding Addition of A and I, into Ata East and Ita West; as it is by N and S following it, into Tan North and Tas South.

In which, we have the 4 cardinal Points $\Delta \Delta \Delta$ of our common Compass; East, West, North and South: which (as such) must always be express'd by their own proper Names: Ata, Ita, Tan, Tas; without any Numerators, or Names of Numbers.

Hence also, we have the 4 Denominators $\Delta \Delta \Delta \bigcirc$ of the 4 different Quarters of the Heavens and of the Earth between them; as North-east, North-west, South-east, South-west; in Atan, Itan, Atas, Itas: each of which must be counted, with the numerical Part of the Names of the 359 several Circles of Latitude: found between the Equator and each Pole: the 2 first, towards the North; Atanba, Atansa, &c. Itanba, Itansa, &c. and the 2 last, towards the South; as Atasba, Atasfa, &c. Itasba, Itasfa, &c. to Itascidusa: Tas, taking the Place of Itascidua; as Tan, does that of Tancidua.

Thus, from the East and West Sides of $\Delta \Delta \times$ the 359 North and the East and West Sides of the 359 South Circles of Latitude; with the 4 cardinal Points, at the East and West Side of the Equator; and the 2 Poles: we have 1440 ready distinguished Points of the Compass.

Which 1440 Points, always divide a $\Delta \Delta \Delta$ great Circle made of two opposite Meridians into 1440 equal Parts; as the Meridians divide the Equator into 1440 Cloves of Longitude: the Distance between each Point, being 15 Minutes in relative Measure

and 15 Miles in absolute; as it is between the Meridians on the Equator: which Space of one quarter of a Degree, is dividable into Minutes; by 15: and those Minutes, in Seconds; by 60: &c. when such minute Distinctions are necessary.

△△○ By the Points of the Compass given, we may also describe the Course of every Line; and by the Names proper to absolute Measure, put after them as the numerical Part of the Names, the Distance run; or Line measured; (according to what they are about:) As Ata-gra, a Degree run due West, or from the East; Itanduola-va, a Mile run from the 94th North-west Point; directly towards Atasduola: the Course of all Lines, from any Point of the Compass; being always directed as the Diagonals of Squares or Parallelograms.

△△× And if a Degree run, from each different Point of the Compass; was reduced to Longitude and Latitude: it might (I think) be a useful, and consequently a proper Addition to our Tables.

△△.: As absolute Measure, the Degree, Minute, &c. of the Equator, cannot properly be expressed, by the same Names and Characters; which signify its Degree, Minute, &c. in relative: those being common to all Circles great or little.

△△! Its Minute, therefore; in absolute Measure, is called a Mile: its Second, Mildua; its Third, Min; its Fourth, Mindua; its Fifth, Pin; its Sixth, Pindua.

△△△ To which, I have in the Tables of Longitude; added its Seventh, Nin; its Eighth, Nindua;

Nindua ; its Ninth, Ninmicua ; as also its Degree, Gra ; its Duagra, its Micuagra, and its Cedamuagra ; &c.

All which, have their several Particulars expressed; by the different Denominators of absolute Measure: Cedamuagr, Micuagr, Duagr, Gr, Ax, Z, &c, J, S, H, R, Secul; with the several Numerators, a, e, i, o, u, uo, ue, ui, uo, uu, with or without da, de, di, do, du.

In the Names, proper to absolute measure; ΔC . Da, is never put alone to express ten ; but Uu : nor De to express twenty ; but Uuda, &c. their Denominators, which are often a single Consonant ; or at least has always a Consonant Determinator: not always admitting, the Determinator of Tens ; immediately to follow it.

In all these given Names, of absolute $\Delta C O$ Measures; the numerical Part, multiplying the Degree ; is put before its Denominator: and dividing the Mile, Min, Pin, and Nin ; after theirs : but should we want lower, or higher Denominations of Measure ; as suppose, a Cube, continent of any astronomical System : (notwithstanding our Abridgment of the Names of Numbers) the Multipliers, would soon grow a great Embarras ; and more arbitrary Names, might burthen the Memory.

We must therefore, (to preserve the Conciseness here proposed) not express the Number multiplying, before a Denominator ; nor that dividing, after it, but only that, signifying the Number of Multiplications and Divisions made by sixty from the denominated Measure : always putting A, before

the Number multiplying a Measure; and before the Measure divided by a Number: to signify that the Measure is not simply multiplied or divided by the Number expressed; but that (by the preceding Addition of A) it now signifies, the Measure to be so many times multiplied or divided by sixty.

Δ C: Thus Cedamuagra, a Degree multiplied by 216,000; by putting A before it, is changed into Acedamuagra, or a Degree 216,000 times multiplied by sixty: and Cedamuagra, becomes expressible by Agagra; a Degree 3 times multiplied by sixty.

Δ C O And if the Ninth or Secula, be not judged sufficiently minute; we have a tenth ready in Agrada: and, an eleventh in Agradaba; from which downwards, and from the Acedamuagra upwards, we have an infinite of Measures offered to our Use.

Δ C X All which Names of Measure, tho' here given only in Lines; are variable by the subsequent Addition of S, into Squares; C, into Cubes; O, into Cylinders; So, into Circles; and Co, into Spheres, whose Root or Diameter is always the Measure expressed.

Δ C: ♀ The Idea of an Infinity of absolute Measures, naturally leads us to an Infinity of Weights; for, every determin'd Cube; Line of Cubes; Square of Cubes; or Cube of Cubes; (which is always the Cube of the next higher Denomination of Measure :) or any expressed Part of them, in a determin'd Matter; must be a determin'd Weight: by which the most difficult Problems in Measure, may (I think) be answered; to a much more minute Exactness than by Numbers and Measures without them. Every

Every Cube, therefore; intended to ex- Δ . I
press Weight: must distinguish, the Matter
it is made of (or rather the Matter, whose
Weight it is made to give) as well as the
Quantity of that Matter; in its Denomina-
tor: to determine its Weight.

And, as Gold, has so long been the Re- Δ . Δ
gulator of Commerce; that its Weight,
seems the most universally known and the
easiest to adjust: the Weight of Cubes;
Lines of Cubes, Squares of Cubes; &c. in
that Metal is proposed to be given in all
Weights: whatever Matter they be made of,
and whatever Form they may be made in.

To weigh any Number of Cubes, from Δ . C
one to sixty; which makes a Line: any
Number of Lines, from one to sixty; which
makes a Square: any Number of Squares,
from one to sixty; which makes a Cube of
the next higher Denomination of absolute
Measure: it is not necessary to have Weights,
weighing 1, 2, 3, &c. Cubes, Lines, and
Squares; of every several Denomination:
but only 5 of Cubes, 5 of Lines, and 5 of
Squares; of so many different Denominati-
ons, as any Person shall judge necessary for
their Occasions: 5 Weights, being sufficient
to weigh any Parcel or Quantity of Matter;
weighing from one, to sixty: of the same
Weights.

The first of which Weights, must always Δ ..
weigh 1; the second, 3; the third 9; the
fourth 27; and the fifth 81 exact Cubes,
Lines of Cubes, and Squares of Lines of
Cubes; determined by the given absolute
Measure in standard Gold: (which Standard,
may be adjusted; if it be not already: by
F 4 the

the Proportion of the Weight of Gold to its Measure) the Unite, multiplied by 3 four times: giving a Number including 60.

Δ. O. ♀ To weigh any Number, from one to sixty; of determined Quantity of Matter by the given Weight.

Put into the first Scale, a Weight, or Weights equal to, or exceeding the Quantity of Matter to be weighed.

And in the second Scale, the Quantity of Matter to be weighed; and if the Weights in the first Scale exceed it; Weights equal to that Excess.



*The First Scale, con-
taining only Weights.*

1	
3	
3	
3	1
9	
9	
9	1
9	
9	1
9	3
9	3
29	3 1
27	
27	
27	1
27	
27	1
27	3
27	3
27	3 1
27	
27	
27	1
27	
27	1
27	3
27	3

*Second Scale, contain-
ing Matter with, or
without Weights.*

1		
2	1	
3		
4		
5	3	1
6	3	
7	3	
8	1	
9		
10		
11	1	
12		
13		
14	9	3 1
15	9	3
16	9	3
17	9	1
18	9	
19	9	
20	9	1
21	9	
22	9	
23	3	1
24	3	
25	3	
26	1	
27		
28		
29		1
30		

The first Scale, containing only Weights.

27	3	I	
27	9		
27	9		
27	9	I	
27	9		
27	9		
27	9	I	
27	9	3	
27	9	3	
27	9	3	I
81			
81			
81	I		
81			
81			
81	I		
81	3		
81	3		
81	3	I	
81			
81			
81	I		
81			
81			
81			
81	3	I	
81	3		
81	3		
81	9		
81	27	9	3 I

Second Scale, containing Matter with or without Weights.

31				
32	3	I		
33	3			
34	3			
35	I			
36				
37				
38	I			
39				
40				
41	27	9	3	I
42	27	9	3	
43	27	9	3	
44	27	9	I	
45	27	9		
46	27	9		
47	27	9	I	
48	27	9		
49	27	9		
50	27	3	I	
51	27	3		
52	27	3		
53	27	I		
54	27			
55	27			
56	27	I		
57	27			
58	27			
59	27	3	I	
60	27	3		
121				

The

The Names of all Weights must first give Δ . x the Matter, then the Dimension, and then the Form; to determine what they intend to give the Weight of: as, Orjac, the Weight of a Gold Cube whose Root is a Pin; (or Fifth in absolute Measure) Oreta, a Line consisting of sixty of these Cubes; which makes a Mildua (or Fourth in absolute Measure) Oretas, a Square (whose Root is Oreta) and consequently must consist of 60 of those Lines, and 3600 Pin-Cubes; Oretac, a Cube whose Root is a Mindua (or Fourth in absolute Measure) as such consisting of sixty of these Squares, 3600 Lines; and 216,000 of the Pin-Cubes: 216,000 Cubes, always making a Cube of the next higher Denomination in absolute Measure: (and consequently, in Weights) the Names of which Weights, are not varied by Numerators following their Denominators; but by the Names of Numbers, put before them; when they intend to signify more than one: as Oretac, Ga-Oretac, Sa-Oretac, Dequa-Oretac, Duiba-Ore-tac, &c.

The Weight also of Cylinders, Circles, and Δ .: Spheres; and consequently, of the several Excesses; of the Line of Cubes, above the Cylinder; of the Square, above the Circle; and of the Cubes, above the Sphere: may be determin'd.

✠ The Diameter of our terraqueous Δ . ò Globe, being by the common Computation of the Ratio of a Diameter of a Circle to its Periphery; near 6875½ Miles: the least of the Cubes here denominated, contentent of it; is the Micuagrac: or Afagrac.

Which

Δ. X Which Micuagrac, contains 216,000 Duagrac; each containing, 216,000 Grac; each containing, 216,000 Vac; each containing, 216,000 Axac; each containing 216,000 Zac; each containing 216,000 Etac; each containing, 216,000 Jac; each containing, 216,000 Sac; each containing, 216,000 Hac; each containing, 216,000 Rac; each containing, 216,000 Seculac; &c. whose particulars, are distinguish'd by a Name and Character; expressing each of their sixty several Longitudes: varied by each of their sixty several Latitudes, into 3600 several Locitudes: and again, each of these 3600 Locitudes; by the sixty several Logitudes, into 216,000 several Lodgitudes or Cubes: which together, not as three but one compound Name; give in the Longitude Latitude and Lodgitude, the Lodgitude or Place of every Cube; in every next bigger: Every one of the 216 Thousand several lesser Cubes, contained in every bigger; differing from each other, either in Longitude, Latitude, or Logitude; and consequently in Lodgitude: all which Cubes are supposed to be placed in the same Direction the Micuagrac the Earth is suppos'd to be placed in; is suppos'd to be placed: and the Longitude Latitude and Logitude of each to be counted (like the Longitude and Latitude of Maps, Charts, &c.) from and to the same one determined Point: which here, are always; either from the South-West and altitudinal Point, to the North-East nialtitudinal Point; or from the North-West altitudinal Point, to the South-East nialtitudinal Point; as they represent a Part of the North, or South Hemisphere.

Every Cube, besides the 216,000 little Δ . Cubes of the next lower Denomination; (which Cubes, have always; all the same Dimension:) contains 60 several Cubes, each of a different Dimension: 216,000, containing 60 several Cube Numbers; the several Roots of which are 1, 2, 3, &c. to sixty; which is always the Units of the next higher Denomination of Cubes: all which unequal Cubes, are counted; (suppose in a Cube whose Root is a Degree, call'd here Grac;) Vac, a Cube whose Root is a Mile; Vec, a Cube whose Root is two Miles; Vic, &c. to Vuodue, a Cube whose Root is 59 Miles; Vuodue, being Grac: as each Square, besides the 3600 of the next lower Denomination; contains 60 several Squares, each of a different Dimension; counted Vas, Ves, Vis, &c. to Vuodus; Vuodus, being Gras: and each Line, besides the 60 several little Lines of the next lower Denomination; always contained in every Line: (which, are always, all equal;) contains 60 several Lines, each of a different Length; counted Va, one Mile; Ve, two Miles; Vi, &c. to Vuodu, 59 Miles; Vuodu, 60 Miles; being Gen, a Degree.

To express any quantity of Space or Matter, not a Cube but contain'd in a Cube; $\Delta \circ 1$ the Denominator must be repeated 3 times; first, with a Numerator expressing its Longitude or Length; then, with one expressing its Latitude or Breadth; and again, with one expressing its Logitude or Thickness; as suppose, in a Cube Mile: Vac: 40 Milduas in Length, 20 in Breadth; and one in Thickness: by, Axundi-Axuuda-Axa: in a square Mile, upon the Area of a Sphere or any

any other Surface: Six Milduas in Length, and two in Breadth; by, Axua-Axe.

Δ ○ Δ

But the Lines, having but one Dimension; viz. (Length) are all counted the same, and the same only; as they are in the 60 several Lines, of 60 different Lengths; contained in each several denominated Line: Lines, admitting no other Distinction but that of Cardinal and Ordinal Numbers; as 1, 2, 3, &c. to 60: which in one or in the other, makes the several Numerators; to every several Denominator of Measure: which determines Va, to be a Mile in Length; any where, or in any Direction: and Van, to be the first of the 60 several Miles counted in the Line Gra: Ven, the second, &c. Va-Va or Vas, to be a Square Mile any where; counting a Mile in Length and a Mile in Breadth, &c. and Van-Van, to be the first in Longitude and the first in Latitude of the 3600 several Square Miles; contained in the square Degree Gras: Va-Va-Va, or Vac, to be a Cube Mile, or a Mile in Length; a Mile in Breadth; and a Mile in Depth any where; Van-Van-Van, to signify the first of the 216,000 several Cube Miles contained in the Cube Degree Grac; as it is counted in Longitude in Latitude and in Longitude to give Lodgitude.

Δ ○ C

The Situation, of any accidental Quantity of Space or Matter; must be described; first, as in some circumscribing Cube: next, the Point from which its Longitude Latitude and Logitude in that Cube to be counted; by the Point of the Compass: its Inclination may be described; and by Zen or Ni-Zen with Numerators, its Ascension and Declination

nation (if it has any) may be determined.

The Earth therefore, supposed to be $\Delta \circ$, placed exactly in the Center of a Micuagrac; placed in the Center of a Cedamuagrac, &c. the eight Cards of its Coracarda; will be found in eight several Duagracs counting 30, and 31 in Longitude Latitude and Logitude varied.

Whence, by the Names of the Cubes gi- $\Delta \circ \circ$ ven; it will be easy to express and distinguish the Name and Place of each several Grain of Sand in it: not only, in the relative and absolute Measure as referred to its own Sphere; but in the latter, as referred to its Place in the Micuagrac &c. the Earth is supposed to be in.

∇ The Situation of the Earth, in this $\Delta \circ \times$ Cube of Space; must be supposed to be such, as that its Axis prolong'd, would from its North Pole pierce that Side next us; and from its South that opposite to it; exactly in the Center of each: and so, through every bigger Cube of Space surrounding it; till it becomes the Axis also of the celestial Sphere: which two Sides, in solid playing Cubes, must always give Yellow for their Livery or Field; charged with the Characters expressing the Latitude proper to the Cube, in the Cube of the next higher Denomination: distinguish'd from each other, as North and South, by the Names of Tanjuna and Tasjuna.

A Needle passing through the Intersection of the first Meridian and the Equator, and also through the Intersection of the Equator

tor and the Meridian opposite to the first ; prolong'd, would pierce the left hand side of the Cube call'd the East, and the right hand side, call'd the West ; in the Center of each : which two Sides, always give Blue as their Livery or Field ; charg'd with the Characters expressing the Longitude proper to the Cube, in the Cube of the next higher Denomination : distinguish'd from each other as East and West, by the names Atazura, and Itazura.

△○○ And a third Needle, piercing also the Equator and the two opposite Meridians ; each ninety Degrees from the first Meridian and from its Opposite : prolong'd, would pierce the two opposite Sides which make the Top and Bottom of the Cube ; also in their Centers : which two Sides, always give Red as their Livery or Field ; charg'd with, the Characters of the Longitude of the Cube, in the Cube of the next higher Denomination : distinguish'd from each other, as its Top and Bottom ; by the names Zanrugia and Nizanrugia.

△× Blue, Yellow, and Red, therefore ; being the three original Colours : (for I confess I know no more, except we allow White and Black to be such :) are here given to Longitude, Latitude, and Logitude.

△○: From whence, naturally flow the three different Liveries ; of the three several Locitudes.

△×! Longitude and Latitude, from its Blue and Yellow ; gives us Green ; Verra.

△×△ Longitude and Longitude, from its Red and Blue ; gives us Purple, Purpura.

And

And Longitude and Latitude, from its $\Delta \times C$
 Red and Yellow; gives us Flame Colour:
Flamma Tincta.

Whilst Blue, Yellow, and Red; gives us $\Delta \times$.
 as the Livery of Longitude; (which always
 consists of Longitude Latitude and Longitude) Brown, *Bruna.*

All these Colours, original and compound; $\Delta \times O$
 are gradually vary'd by White and Black (the
 Representatives of Light and Darknes) till
 all are lost in each.

The equal, or unequal Mixture of all $\Delta \times \times$
 Colours; cannot make White: nor does any
 Experiment made to prove it, (I think) demonstrate more; than that we are as utterly
 unable to distinguish Colours, in an excessive
 Light; as in Darknes: all appearing White
 in the first, and Black in the last.

The Liveries of Distance from the Sur- $\Delta \times$:
 face of a Sphere, and the Periphery of a
 Circle divergent, is White *Alba*; and convergent,
 is Black *Nialba*,

☞ Nothing is more obvious, than that $\Delta \times O$
 to determine our Longitude; it is absolutely
 necessary thoroughly to examine our Cosmography
 and Astronomy: and to place all we find (to our Purpose)
 determined or determinable, in the strongest Light possible;
 for the Observation of all: that thus, all Conclusions
 may be demonstrative; and made in the View, (by being brought to the Capacity;) of all the World.

Mistaking the Form of the Earth, must $\Delta \times \times$
 have the same Effect upon the Determination of our Longitude;
 as mistaking our Latitude

titude: either, giving us a false Rule to measure by.

Δ × : Astronomy, has certainly (at present) the best Right to determine Relative Measure: and measuring by a Wheel, (both by Sea and Land) Absolute.

Δ : I The Sun, the Moon, and the fixt Stars; were all created by God, on the fourth Day: and placed in the Heavens, expressly; for Signs, and for Seasons; for Days, and for Years: to give light upon the Earth, and to divide Light from Darkness: a Truth, which (I own) appears to me; not sufficiently consider'd.

Δ : Δ From hence therefore, I take my Directions to divide both Spheres by Meridians, and by the Equator and its Parallels; into Cloves of Longitude, Rings of Latitude, and consequently, Cards of Locitude: and into lesser Cards of Minutes, Seconds, &c. which includes the whole Relative Measure, proper to the Celestial and Terrestrial Spheres: by which all Time is determin'd.

Δ : c But I expect not from Eclipses, (which are only the Shadow of Opaque Bodies, or the Interposition of those less Luminous) any Relative Measure; except, that proper to the Equator; and that only, when they happen directly upon it: but always the same Measure, which on every Circle of Latitude, is Absolute Measure only; and must therefore be turned into the Relative, that Absolute answers to; in the Latitude the Eclipses happen in: (by the Tables giving both together) that we may be able to describe them in both.

This

This Phænomenon, has perhaps helped $\Delta : \times$ to confirm the Opinion of the Prolate Figure of the Earth; as that Supposition, may have encouraged the Belief; that this Measure, could not considerably differ: from that proper to the Latitude of any Eclipse.

And thus two Errors seem to me to have $\Delta : \circ$ supported each other; in the most plausible Manner possible.

However, as all Maps, Charts, &c. are $\Delta : \times$ made by Degrees (tho' perhaps differing from, convertible into those of our absolute Measure:) it cannot be difficult to know, the absolute Measure contain'd in every Degree, Minute, &c. in any Latitude.

And from our Tables, giving the absolute Measure contained in every Circle, Degree, &c. it will be as easy to add the relative Measure answering to any express'd Quantity of absolute Measure, in the Latitude given; as to add absolute to relative Measure, in order to have both: as is here always proposed.

But if the Degree of our Equator be already adjusted, and its Measure known; in the Leagues Miles, &c. now in Use to count Distance by: (which tho' generally allowed, appears not to me demonstrated;) all Maps, Charts, &c. determined by it, are already given in our absolute Measure: to which, our Tables give us the Relative for every Latitude.

So that, Maps, Charts, &c. made by the $\times : \times$ Spaniards, Portuguese, or any others, faithfully measured, by any absolute Measure, are all equally useful to us: being all reducible

ble into, both our absolute and relative Measure.

Δ::: Yet, (how unwilling soever we are; to give ourselves that Trouble:) nothing but measuring the Earth, can determine its Form and Dimension; to a Demonstration.

ΔÖ! And, if we have it not so determined; we must not say, it is because such a Determination is impossible; but because, we think it too much Trouble to measure the whole Earth.

ΔÖΔ To determine the Form and Dimension, of any Part of it; it has always been found necessary to measure that Part: and the Maps and Charts, these Measurements have given us; are (no doubt) of great Use to Particulars: But I own, our Cosmography appears to me; far from being upon that Foot of Universality, as to serve decisively to determine our Longitude: which demands (as an absolutely Necessary) the Knowledge of the Whole.

ΔÖC The Difficulties, attending such a Mensuration; are (perhaps) apprehended to be greater, than in Reality they are.

ΔÖ. We have now no Occasion to carry the Wheels we measure by, on Land; but may be carried by them, whilst measuring.

ΔÖO Nor need we depend on the uncertain Guide of the Log-Line, by Sea, or on any Water; for our Distance run: but may have Water-Wheels, to measure our Course by Water, as other Wheels do by Land: which must be made of a Matter the least subject to rust, rot, or wear out, possible.

ΔÖ× And when we know exactly, the Measure of the Degree, &c. of our Equator; which
is

is the Degree, &c. of our Absolute Measure: all our Wheels, whether intended to measure Land or Water; ought (I think) to be made to give them in regular Proportion: as Time, is proposed to be measur'd; by the Wheels of our Astral Clocks and Watches and their Beats.

Whenever, the Weather or any other $\Delta \circ \circ$: Accident interrupts our measuring; either by Land or Water: we may, (since every Place has a distinct Character as well as Name proper to it;) fix the Character of the Place to which we have measured: and return to our measuring, when we can, or when we please: but it must always be, with the greatest Care and Exactness possible.

When we meet with large Tracts of $\Delta \circ \circ$ Ground which cannot properly be call'd either Land or Water, I confess I know no Wheel-Carriage or Vehicle able to carry us through or over them; so that, there seems to be a Necessity from the Place they are so stopt in; to measure upon a Secondary, till we find a Parallel passable: and again, return by a Secondary to the Meridian or Circle we were measuring; when interrupted: always fixing Characters, not only upon the Place where we found the Interruption in measuring any Meridian or Circle; and where we found Means to re-assume it again: but where, upon the Secondaries we were forc'd into; we found a Parallel passable: and where in that Parallel, we found a Secondary; by which we could return to the Line we were interrupted in measuring: but some little Distinction should (I think) be made; between the Characters marking the

Intersections, upon the Equator, Tropick, the Polar Circles, the Colures, &c. and those, only pointing out a Remedy ; to the Inconveniencies we meet in measuring them : Rules of Prospective, may also here serve us.

△ ○ × The Wake of Ship, &c. on Water, and the Tract of the Wheels on Land ; must (I think) give us our Course: either exactly true, or with so little Variation ; that it cannot be difficult to account for, and correct.

△ ○ : And having now, an Infinity of Points of our Compass ; distinguish'd or distinguishable: we may express its Direction, to what Minuteness we please.

△ × | And the Longitude and Latitude made, by a Degree run on any one of the 1440 Points of our Compass ; now making a Part of our Tables: must intirely remove all colour of Difficulty, in computing our Place from our Distance run.

△ × △ ☞ To make our Cosmography able fully to answer the Intention propos'd, we must then measure the Earth ; and as no part of it has been delineated with more Care and Exactness, than that, where our first Meridian is placed ; an Adjustment of our Maps, &c. may (as is most natural) begin from thence.

△ × c Whence, measuring to the Equator ; exactly upon that Meridian, we find or suppose is to be found ; close to, but West of ; the Place of that Manger, in the Stable of *Bethlehem* ; where Humanity, was justly honour'd, by the Adoration of Angels ; in the Person of our LORD JESUS CHRIST : who taking our Nature upon him ; (that
as

as Man, being justified by God; He might merit Man's Redemption) ceas'd not to be, their God and ours.

And then, exactly where the first Meridian cuts it; place the first Character of Longitude Ba, without any Latitude: the Equator from which both North and South Latitude are counted; it self having neither: as the two Poles, which must be mark'd by the Characters of Latitude Tancidua and Tascidua; without any Longitude: because each only signifies a Point, which always contains a whole Circle; but can never distinguish its Parts.

The first Meridian, upon which this Character is placed; as well as upon the Equator: in the Interfection of both, by each other: must be consider'd as a Line parting the first Clove of Longitude Ba; from the last Macodo: Ba being on its East Side, and Macodo on its West; which East and West Sides, are our Right and Left-Hand, according to the Denomination of the Latitude we are in.

The Top, of a Semi-Clove, Ring, or Card; always signifying that Part next the Equator, which we count our Latitude from; and the Bottom, that nearest the Pole we count it to; be it North or South.

On the South Side, therefore; of the Equator: as we count to the South Pole, the Top of the Semi-Clove, Ring, or Card (and consequently of all Maps, Charts, &c. made to describe any Part of it) must be North; and the Bottom South: the Right-hand East, and the Left West.

△ × ○ And on the North Side of the Equator, as we there count to the North Pole: the Top, of the Semi-clove, Ring or Card (and consequently all Maps, Carts, &c. made to describe any Part of the northern Hemisphere) must be South; and the Bottom North: the Right-hand West, and the Left East.

△ × × Our Longitude, be we in North or South Latitude; is always counted from West to East: when therefore we are in North Latitude, we must count our Longitude from the Right to the Left hand; and, when in South, from the Left to the Right.

△ × : Every Character, placed on any Meridian; must always express the Longitude of the Clove at its East-side: and the Latitude of the Circle it is also placed upon, if the Circle has any Latitude; that is, if it be not the Equator.

△ : . And every one, placed upon any Circle parallel to the Equator; must express the Latitude of the Ring above it: after having distinguished the Longitude, of the Meridian it is also placed upon: if its Longitude admits of Distinction: that is, if it be not Tancidua or Tascidua; the North and South Pole: neither of which, admits of a Distinction in Longitude; each, only expressing a Point.

△ : △ Every Character therefore, intended to be placed so as to express Place; on any Part of our terraqueous Globe: must express it, as Locitude; consisting of Longitude and Latitude: except on the Equator, where Longitude alone is to be given; and on the two Poles, where the Latitude proper to each, is also always given alone: which Characters of Cards, are always all placed exactly upon the Intersection

of two Lines; bounding their West-side and the Bottom of the Card it expresses.

Durst we trust, to the Determination of $\Delta :: C$ our Latitude; without any further Examination: we might possibly thence have the Degree of a great Circle: and then, by it begin to measure; not only the Distance between *Betlehem* and the Equator, but the Equator itself; and at the Distance of one quarter of a Degree, (supposing it to be our Clove of Longitude) mark it with their Characters as we first measure.

But, should such a measuring and marking; $\Delta :: O$ produce us more or less than 1440 Cloves of Longitude upon our Equator: nothing could be more mortifying, than to see so many Monuments raised; to perpetuate the Memory of our Want of Caution: in the Absurdity, of a Circle with more or less than 360 Degrees; and the Measure of a Day, with more or less than 1440 Minutes.

As Measuring, is therefore; absolutely $\Delta :: O$ necessary: the utmost Care ought to be taken, in measuring from *Betlehem* to the Equator; not to deviate from the first Meridian: and exactly to distinguish, the Equator; upon the Intersection of which two Lines, the Character Ba; signifying the first Clove of Longitude; is to be placed.

After which, (I confess) I see not where $\Delta :: X$ to place a second Character; to my Purpose: till the Measure of the Equator, be took by Wheels, from Ba, (directly upon the Line;) to Ba again.

This Measure of the Equator, thus took; $\Delta :: :$ be it what it will: must be divided, into 1440 equal

equal Parts; each of which is one quarter of a Degree of the relative Measure proper to it: and consequently, 15 Miles in absolute.

Δ:·○ By this Measure, (as the Relative proper to it;) we must remeasure the Equator: beginning at the first Meridian, where we already have placed Ba; and thence measuring 15 Miles directly East upon it: exactly upon its Intersection, with the second Meridian; place the Character Fa: signifying the second Clove of Longitude, and so on; till we have placed all our 1440 Characters, expressing the 1440 Cloves of Longitude, answering to the 1440 Minutes counted in each Day.

Δ:·× Now, let the Form and Dimension of the Earth; be what it will: the Measure of its Equator, divided by 360 into Degrees; and by 21,600, into Miles, &c. is the absolute Measure; I must measure, but I dare not yet mark it by; further than I have measured and divided by the Proportions proper to all Circles of Latitude: as all counting 24 Hours, 1440 Minutes, 86,400 Seconds, &c. because, the Characters I am to place upon the Earth; all express the relative Measure, counting Time: tho' to adjust their proper Distances from each other, on every Circle of a different Latitude; I am oblig'd, first to measure every Circle by this absolute Measure: which is the Relative proper to its Equator.

Δ:·: By this absolute Measure, which is the Relative proper not only to the Equator; but to every great Circle in a right Sphere: we must next measure, exactly upon the first

first Meridian, from Ba, placed upon its Intersection with the Equator; to *Betblebem*: and having placed a Character, expressing the absolute Measure between them (there;) measure on still, directly to the North Pole.

If this Measure answer to one Quarter of the Equator, we may immediately (perhaps best in returning) remeasure and mark it; by placing at 15 Miles, or one quarter of a Degree's Distance from each other; all the 360 different Characters, signifying the 360 several Rings of Latitude; on that Side of the Equator: with Ba, to express their Longitude; together, giving their Locitude: Ba-Tanba, Ba-Tanfa, &c. to Ba-Tancidua.

But should this Measure be found more or less than 5,400 Miles; it must still be divided into the same Number of Parts; and all the same Characters be placed upon it at equal Distance from each other.

The 4 Meridians, Ban-Solina, and its Opposite Cuedeba-Solina; together making the solstitial Colure: and the Meridians Ciduban-Solina, and its Opposite, Maduiban-Solina; (which together make the Equinoctial Colure:) must all, be thus measured and mark'd: by which Means, the Earth will become a Coracarda; or Sphere divided into 8 Cards.

The Contents of which Cards, must be well known; not only in general, as that each contains a Square in relative Measure; whose Root is 90 Degrees: (each consisting of, 360 times 360; or 129,600 Cards of our Cocarda) and that their Latitude, is only distinguished as North and South; without any Numerators: but distinctly, as what
remark-

remarkable Parts of the World; each contains: That the *Holy Land*, is upon Ba-Tan: *England*, upon La-Tan; &c.

CIO *Europe, Asia, Africa, and America*; making almost as uncouth Figures upon the terrestrial Globe, as the Constellations do upon the celestial: only, they have no Voids between them; but together, make the whole Area of the Globe; which the Constellations do not.

CIX In this Measuring, finding our Meridians all equal to half the Equator; cannot however prove that the Form of the Earth is an exact Sphere: tho' it must, nearly determine its Dimensions: because, such an Agreement with its Proportions; may happen to be found in a prolate Sphere: (such as the Earth is generally represented to be, by our most followed Authorities)

CI: To be, therefore; demonstratively sure of its Form; and to other good Purposes: it seems to me absolutely necessary, to measure the Tropicks and Polar Circles; and if their Measure, agree with the Proportion given to the Circles found in their Latitude; in our Tables of relative and absolute Measure proper to a right Sphere given together: the Earth must (I think) have that Form allowed it.

CIO Which Circles, must (to be of any further Use than thus determining the Form of the Earth) be divided into 1440 equal Parts; and at the Distance (in absolute Measure) found to be contained, in its Clove: or Minute, of Time: measured due East, from the Characters Ba-Tanduola, Ba-Tafduola, Ba-Tanceduapa, Ba-Tafceduapa (already placed

placed upon the first Meridian; as a Part of the Solstitial Colure:) place all the rest, of the 1440 several Characters of Longitude as on the Equator each with the Latitude, proper to the Circle it is placed upon.

But in case these Circles be found, not to answer those in the same Latitude of a right Sphere; tho' it certainly proves that not to be the Earth's Form, yet it must tell us what really is so; and fully determine both its Form and Dimension.

And such a measuring, and by Characters marking the Earth; will not be less serviceable to Astronomy, than to Geography and Navigation: especially if a strict Observation is made, and a just Account constantly given: of all that is necessary: from as many of the Intersections, where the Characters are placed; as are or shall be inhabited.

For, by it; the whole terraqueous Globe will be made one useful Dial: common to all its Inhabitants: parallel to the celestial one, we have in the Heavens; as demonstrable to the poor Shepherd or Mariner, as to the most learned Astronomer.

As the Rows of Characters here proposed to be thus disposed upon the Earth; must happen to be found, sometimes on Land and sometimes on Water; when on Land, they may be placed, each on all the four different Sides of square Pillars or Posts: fixt so, as that the four Sides of each Pillar; shall directly face the East, West, North, and South-Points of the Compass.

And when on Water, the same Posts (without their pretending to determine their Situation

ation with regard to any Point of the Compass) may be placed upon large Buoys, the Hulks of Ships, &c. (fix'd by Anchors, or otherwise; as is found most convenient in the several Places each Character is fix'd upon:) with the Character expressing their Locitude, on each of the four Sides of the Pillars bearing them.

☞ Δ . Without any Design, of entering into the Dispute; whether there be or be not such an Animal: the Faculty, attributed to the *Remora*; (*viz.* of stopping a Ship under full Sail:) affords too conspicuous an Advantage to be over-look'd.

☞ Δ ○ Allowing it therefore to be really Fact, can we more naturally attribute it to any Cause; than that this little Animal, (like the Spider or Silk-Worm) spinning some glutinous Matter (which the Sea toughens) from its own Intrails; first, fastens that strongly at the Bottom of the Sea; to the Sea-Weeds, Coral-Trees, Oyfter-Rocks, &c. it finds there: and then soaring directly up, fastens itself to the Bottom of a Ship; by the same conglutinous Matter: its Mouth, (perhaps) sticking to the Ship, like a Leather fastened to the End of a String; by which, we see Children raise large Pebbles, &c. from the Ground.

☞ Δ × It is plain, the *Remora* (here) acts as an Anchor fastened to the Bottom of the Sea; and therefore, as we cannot draw up or disengage the End of its Thread; we must, to set the Ship at Liberty; part it from the *Remora*.

No

No doubt, there are many Places in the Δ : Ocean where dangerous Rocks threaten; and no Anchorage is to be found: how welcome, there; would a poor little *Remora* be to a Ship's Crew: in an Instant, anchoring their Vessel; when driving full upon the Danger, or rather Destruction; they see, but cannot avoid.

The very Being, of this little Animal is $\Delta \circ$ in Doubt; and were it fully proved, bringing them into Discipline, and appointing them their Stations; is not really my Intention: but only, by their Examples; to make artificial *Remora's*, and place them where it is judged the real ones may be wish'd for.

That is, fastening the Ends of Cables $\Delta \times$ (like the *Remora*) at the Bottom of the Sea; or to a Rock, &c. by such means, and in such manner; that is best suited to every place, they are to be fixed in: and raising the other End of the Cable, to the Surface of the Water by Buoys; fixing to the Ends of the Cables so raised Rings, or Hooks, or both; in such a manner, that they may conveniently be fastened to other Rings, Hooks, &c. fix'd to the Bottom of Ships: or to short Cables from them, for that Purpose.

And as (no Opportunity to determine our Δ : Place is ever to be lost) every *Remora* or Buoy, raising the End of a Cable or Cables; with Rings, Hooks, &c. must have a Character, fix'd upon it; expressing the Locitude of the Card, the other End of the Cable is fasten'd upon.

These *Remora's*, also offer us their Service; to point out and direct, any Voyage, &c. we would particularly distinguish.

And

CCΔ And also, to give the Longitude and Latitude of every Sea-Port, Bay, &c. as the Pillars fix'd on Land, do to determine that of Capital Cities, &c. or whatever else, may merit or want a particular Distinction.

CCC The Longitude and Latitude of every *Remora*, or other Character expressing Locitude or Place; placed out of the five Circles and four Meridians (proposed to be all measured, and with the two Poles mark'd at one quarter of a Degree's Distance from each other:) must all be measured, from some Character placed in them; by Wheels, the same as they were measured by: a less Caution, not being sufficient; to make our Cosmography a Parallel to our Astronomy.

CC. Much Care, therefore; and great Authority: seems necessary, to prevent the fixing any Characters; at least such, as have any Resemblance to those fixed; with so much (tho' no more than necessary) Caution: by private People at their Pleasure.

CCO The exact measure of a Third, a Second, and a Minute of Time: measured directly West, from the Characters; placed upon the four Meridians making the equinoctial and solstitial Colures: (at least upon the Circles next the Equator, the Tropicks, and the polar Circles;) and mark'd with the Characters, signifying those Quantities of Time; at the Distance (in absolute Measure) proper to the Circle: will also be very useful and agreeable to our Purpose.

CCX ☞ As Astronomy, is incomparably a more easy and more entertaining Study than Geography; it is no wonder we find the Heavens

Heavens delineated to a much more minute Exactness than the Earth.

We have, thence; a Catalogue of near 3000 Stars: whose Magnitudes, are all distinguished; and whose Places, are determined in Longitude and Latitude, right Ascension and Declination, to Fourths.

Now, whatever Space a Fourth measures in their Orbits; we know it answers but in Parallel to a *Mindua* on Earth: which supposing our Geographical Mile, to be 2000 Yards; our *Mindua*, 300 Foot; and our *Min*, 20 Inches; can be but one Third of an Inch, or a Barley Corn upon the Equator: and on its Parallel next each Pole; it is only 15 *Pinduas*, or the fourth Part of a Hair's Breadth: the absolute Measure of all Circles, decreasing as they decline from the Equator; to either Pole.

If therefore, the Place of every Star in this Catalogue; really be correctly determined: I see not what we have to ask from Astronomy, it may not (properly observed) be able to give us.

However, to reduce them to our Use; it is absolutely necessary to have Tables made, giving the Magnitude, and parallel Locitude of every Star; as its Name expressing its Longitude, as placed in some one of the 1440 Cloves; and then its Latitude, as placed also in some one of the 720 Rings; which together, are its Locitude; determining its Place in some one of the 1,036,800 Cards: which are all contained in the 1440 Cloves of Longitude; and also, all, in the 720 Rings of Latitude.

H

This

- C. I This parallel Locitude, must not be sought in Tables made to give the Longitude and Latitude of the Stars; but in such as give their right Ascension and Declination: because, celestial right Ascension and Declination; being the natural Parallel to terrestrial Longitude and Latitude: they are here given together, as our parallel Locitude.
- C. Δ Having thus, in the right Ascension of the Stars; their parallel Longitude in relative Measure: we may, from our Tables (giving the absolute Measure answering to every Circle parting the 720 Rings of Latitude from each other) easily have the absolute.
- C. C And in their Declination, their Parallel Latitude; both in absolute and relative Measure: both being the same, on all great Circles.
- C. . As our celestial first Meridian, is a cardinal Point; and our Constellations, only Cards or Squares in relative Measure; having no Voids between them: each Card signifying the first, second, third, or fourth fifteen Minutes, of some one of the 360 Degrees of Longitude found on the Equator; and on every Circle of Latitude from it, to each Pole: with the first, second, third, or fourth, fifteen Minutes, of some one of the 90 Degrees of Latitude found upon every Semi-clove; or between the Equator and each Pole.
- C. I O And consequently, every Card of a quarter of a Degree; consists of 15 times 15, or 225 Squares or Cards of Minutes: every Card of a Minute, 60 times 60, or 3600 Cards of Seconds, &c.
- C. X The Place therefore of every Star, in right Ascension and Declination; is its Place in our Constellations; but yet, wanting the absolute

solute Measure of the Longitude of the Star: Astronomy giving them, only in the Relative proper to a right Sphere.

Thus *Aldobaran*, a Star of the first^{C.:} Magnitude; having Place in, the 1338th Clove of Longitude; and in the 42d Ring of Latitude: must be called A-Macidira-Tandofa.

And *Cor Leonis*, another Star also of the first^{C. O} Magnitude; having place in the 85th Clove of Longitude; and in the 323d Ring of North Latitude: its Name must be, A-Duina-Tancidega, &c. To which may be added, the Distinction of its Minute Card, Card of a Second, &c.

To give the Longitude of any Star, in^{C. x} absolute Measure; which we find in relative: exactly: we must first, from our Tables; take the Degree, &c. proper to the Top and Bottom of the Card it is found upon: in absolute Measure: and then from its Latitude in the Card, compute the Longitude of the Minute, &c. of the Circle it is upon.

Whence, (absolute Measures being here^{C.:} reduced to the same Proportion as the relative;) if we find the Degree 20 Miles 15 Milduas and 4 Mins: we know the Minute must be 20 Milduas 15 Mins and 4 Minuas, &c.

And knowing, the exact Place of every^{C O I} Star; in every Card, Minute Card, &c. must extremely help us, to form an Idea of the Bounds of the Cards; their Minute Cards, &c. which are our Constellations, distinguish'd into Parts.

☞ Astronomy and Cosmography, are^{C O Δ} always (but particularly in this Parallel)

checks upon ; as well as Dials, counting the Astral Day to each other.

CO C The Beginning of this Astral Day, is when the Celestial first Meridian ; is exactly zenithal to the Terrestrial : and consequently, every Celestial ; to its Terrestrial Parallel.

CO · Whence, the first Celestial Clove Celba, being totally zenithal to the Terrestrial one, Terba : the Celestial Cloves, constantly all moving Westward ; so as that, at the Commencement of the second Astral Minute ; Celba, will be totally zenithal to Termacodo : and Celfa, to Terba.

COO A Person therefore, placed by the Manger at *Betblebem* ; on the Equator, or on any Circle parallel to it, exactly where it is cut by this same first Meridian : may count all the 1440 several Minutes of the Astral Day, by the 1440 several Celestial Cloves of Longitude ; as each, in consequence must become zenithal to the first Terrestrial Clove they are upon : always there denominated, from the Clove zenithal ; Celba, Celfa, &c. Bata, Fata, &c. but on every other Meridian, the 1440 several Minutes of the Astral Day ; are always counted Bata, Fata, &c. by the Celestial Cloves, following that which is the proper Parallel to the Terrestrial where we are.

COX If therefore, *London* be just $41 \frac{1}{2}$ Degrees West to *Betblebem* ; the Celestial Clove zenithal to it, at the Commencement of each Astral Day ; must be *Celcaduapa* ; whence, moving Westward ; it becomes totally zenithal to *Tercaduana*, at the Commencement of the second Minute, Fata : of every astral

tral Day, whilst Celcaduagua, becomes zenithal to Tercaduapa, &c.

Thus the Inhabitants of every Terrestrial Clove of Longitude (each from its proper Celestial Parallel Eastward;) all count the first, and consequently all the 1440 several Minutes of the Astral Day; at the same time: as the Equinoxes, and Solstices are counted.

In all astral Days; the Minutes, Seconds, &c. are all equal; we may if we please, call 60 Astral Minutes an Astral hour; but (I think) the Astral Day, is best counted; only by Minutes: and all Astral Time, by Days: because, till the Precession of the Equinoxes, &c. is fully proved and determin'd; we cannot, in their Revolutions; count its Years: the first of which, will probably be unfinish'd; when the World shall have an End.

To each Astral Day, we therefore; give the Name of the Number of Revolutions each fixt Star has made (in and with the whole Firmament of the Heavens) since that great Æra, it is counted from: with the sequent Addition of R, to signify that it expresses so many Revolutions round the Earth: as Bar, Far, &c.

The Revolution of the Sun and of the Moon, &c. over the Earth Westward, gives us their Day; and their Revolution Eastward, their Year; wherefore the fixt Stars not perceptibly moving Eastwards, count no Years: but only Days.

More strongly to fix an Idea, of one absolute Time; common to the Inhabitants of the whole World: (which compared with

the solar Time proper to each; must tell them all (I think) where, they must be; or in other Terms, determine their Longitude:) it is absolutely necessary to have Tables made, giving the exact Place of the Sun, and of the Moon, &c. at the Commencement of each astral Day; and of the solar Time at *Bethlehem*: not only consequently, from the Sun's Place; but particularly expressed.

c x Δ ☞ This absolute or astral Time, being the Rule by which all other Time must be measured; we must have Clocks and Watches made to give it.

c x c If they go too fast, or too slow; we have the Revolutions of the Heavens, (the only regular perpetual Motion God has given us) at all times; and in all places; ready to correct them by.

c x . Their Beat must always express a determined Time: as suppose, 12 Thirds; in consequence, 5 Beats is its Second; 300, its Minute; and 18,000, its Hour: which is the Medium between 16,000, and 20,000; the Number of Beats now generally given in an Hour by our common Watches giving the equated solar Time.

c x o On the Dial-plates of these Watches or Clocks, the 24 Hours must all be expressed; by the Characters, signifying the first, the 61st, the 121st, &c. Clove of Longitude: every 60th Clove, representing the 60 Minutes counted before it; by which means our 1440 Cloves of Longitude; give us just 24 several Characters: to express our 24 several Hours by.

Which

Which 24 Characters must all be placed $C \times \times$ upon two several Circles in each Dial-plate; the one representing the terrestrial unmoveable convex Sphere of the Earth, and the other the ever-moving concave Sphere of the Heavens; together always shewing us (in the Distance between the celestial first Meridian and the terrestrial) the Minute, &c. of the astral Day.

Between these two Circles (but so as to $\times$: be both upon the fix'd Plane with the inner Circle) must be graved, two Circles; hollow: So, as that; two little Suns, may at Pleasure; be moved and fixed in the one: and two little Moons in the other.

When the Sun comes to our Meridian, $C \times O$ one of its little Representatives must always be moved; and so placed, as to mark the astral Time; we have Noon at: the other, always marking the absolute Time; when we had Noon the Day before.

Thus, in the Distance between the two $C \times \times$ little Suns; we have always the Excess of the solar Day past, above the astral; in absolute Time.

And the two little Moons, moved also $C \times$: when that Luminary comes to our Meridian; will in the same manner, give us the Excess of every lunar Day above the astral: also in astral Time.

All which Excesses, both of each solar C : and each lunar Day; must (with great Care and Exactness) have a written Account kept of them: remarking always the Time of the Year, with the solar Excesses; and the Age, (or perhaps rather the Declension) of the

Moon; with the lunar: in which Excesses, we must have good Equation Tables.

C:Δ That, the Intention of this Æra; from which we count all our astral Days: viz. (to count and measure all to his Honour, who made them all for us) may ever remain with us: Let all astral Clocks and Watches, have, in the Middle of their Dial-Plates; a Representation of our Infant Lord: with his blessed Mother, and St. *Joseph*; in the Stable of *Bethlehem*.

C:C Between the Characters, marking the 24th and the first Hour; upon the first Circle, just over this Representation; (in the Place of the first terrestrial Meridian:) the happy Shepherds, to whom the glad Tidings of our Saviour's Birth; was first brought.

C:. On the parallel Part, of the moving Circle representing the Heavens; that of the kind congratulating Angels, who brought to them and us, the reviving Message.

C:O And between each of the Characters expressing the 24 Hours, a little Cherubim; in Remembrance of the Joy, with which the good Angels saw the glorious Humility of their God; condescending, even to become Man; to redeem their poor self-undone Fellow-servants: and in the most solemn Manner (surrounded with heavenly Light) at Midnight: proclaimed Peace, to all that will to serve him; in Hymns of Praise to God, and Good-will towards Man.

C:x ♄ Having now, one new Table giving in absolute Measure the Longitude of the Equator; and all its Parallels parting the Rings of Latitude from each other: each
divided

divided by 360, to find its Degree; and that Degree by 4, to find its Clove, &c. counting Time; the Contents of each different Card, (and consequently of the whole Area of the Earth;) and the Longitude and Latitude made, by a Degree run; on every one of the 1440 several Points of the Compass.

Another, giving us Names; by which we can express and distinguish, every Star found in each of the 1440 Cloves of Longitude; in each of the 720 Rings of Latitude; and consequently, in each of the 1,036,800 Cards of Locitude; which is always the first Distinction of Place in relative Measure: determining at the same time their Magnitude, by a preceding Vowel.

And a third, giving the solar Time at *Bethlehem*; at the Commencement of each astral Day: and the real Place, of the Sun; the Moon, &c. at the same time.

It seems desirable, that all Boys intended for Sea; should (as soon as possible) be taught, the two first by heart; and readily to answer, any Question they carry: and from the third, to compare solar time with astral; in order to determine our Longitude.

Saying the Tables by heart, is not sufficient; they must enter into the Reason of all: and be able to find, as well as name every Star.

Every one of them, therefore; must have all these Tables: an astral Watch, and a Pocket-Book; with Access at least, to a celestial Globe, painted blue; the Milky way being distinguished, by being of a lighter blue

blue than the rest: divided, by the Equator and its Parallels and Secondaries; into Cloves Rings and Cards: by black Lines: only the Equator, the Tropicks, and the Polar Circles, with the Equinoctial and Solstitial Colures; being distinguished by broader Lines: all the Stars, found in the Catalogue of Stars; (which may be expressed and distinguished by Gold Patches, of six several Sizes; to signify the six several Magnitudes;) being placed (by the Direction of their Names, given in our Tables) in these new Constellations.

◐◐◐ Upon which, a little Sun may be fixed; exactly where the first Meridian cuts the Tropick of *Capricorn*: and a little Moon, exactly upon the Intersection of the equinoctial Colure with the Equator: which little Sun, and little Moon, must each of them have a large Clew of Gold Thread, or Gold coloured Silk; fastened to it: by which the several Courses of each amongst the fixt Stars may be described: as may, the Course of any Planet, &c.

◐◐◐ When they are perfect in their Tables, and can trace the Stars upon the Globe; as in their Tables: all readily, by their Names; that is, by the Names of the Card; each is found in.

◐◐◐ And when it is required of them, also by that of the Minutes Cards in it; the Second, in that Minute Card, &c, more particularly to determine its Place in each several expressed Measure: and begin to have a good Idea, of what they are about.

◐◐◐ A Number of them, may (I think) with great Profit, be took out in Star-light Evenings

ings by some Person well skill'd in Astronomy: who may, first teach them to find the elevated Pole, and their Zenith; which I own appear to me, the two first absolutely necessary Determinations to be made; in order to proceed (with any Certainty) to make any astronomical Observations.

And having thus engaged their Attention, must proceed; to trace to them that Part of the Clove of Longitude, zenithal to them; which makes the Distance, between their Zenith and the elevated Pole: and having sufficiently remarked the Place of the Pole, by tracing a Number of Rings round it; from thence, strike down the opposite Meridian; to the very Horizon; where they may find their Latitude, if the Place is open enough to admit it.

By this means, Boys having a right Aim given them at first; the Acuteness and Docility with which we see Children learn to shoot, bowl, throw Balls, &c. in Play, makes it natural to hope, they will soon come to a great Dexterity in tracing Stars in Cloves and in Rings; which seem to resemble etching at Arms Length.

It is true, they must expect to find many Cloves and Rings without any Star upon them; and few that have many: but every Star they see, in its Name giving its Place; they must all appear to them, like so many well-known Marks upon a Bowling-green; directing them how to steer their Course amongst them.

Whence, I cannot but hope; tracing the Meridians and Circles, parting Cloves and Rings amongst the Stars; may soon be made

as agreeable a Diverſion to Boys intended for Sea, as playing at Nine-pins.

c ò. And, by being uſed to trace the zenithal Cloves as they ſucceed each other; each Boy in his Turn: they may be taught to count the 1440 ſeveral Minutes of the aſtral Day, by the Stars; as readily, as to know the ſolar by a Sun-dial.

c × I Tho' it has here been propoſed, that a Perſon well ſkill'd in Aſtronomy ſhall at firſt go out with the Boys to teach them readily to find the elevated Poles, and their Zenith; and to trace to them, the Diviſions of their Conſtellations: giving them the Name, of every Star they find in each Clove and in each Ring; in the Name of the Card, each Star is found upon: with a preceding Vowel, to diſtinguiſh the Magnitude of the Star ſo found: yet it is not without foreſeeing great Difficulties, to find a Perſon well ſkill'd in Aſtronomy; that will undertake ſuch an Employ: and the Boys had much better go out alone, with their Tables, &c. than with a Smatterer.

c × Δ I cannot but think, we have great Numbers; who on ſuch a Propoſal, would ſay: they have, by many Years Study and great Application; qualified themſelves to teach Aſtronomy: and are not unwilling, ſometimes to allow their Scholars to go out with them in Star-light Evenings; and to point out to them, the ſeveral Conſtellations; and all other Neceſſaries towards their learning that Science, by the ſame Rules themſelves were taught it by: but are not now to be taught Ba-Tanba, &c. in order to trace the right Aſcenſion and Declination of the Stars;
for

for lazy Boys, who will not undertake a regular Study.

How reasonable soever, such an Harangue c x c may sound in the Ears of some; I own to think Boys desirous to be taught Astronomy by this Method; have by it, just Reason of Complaint given them.

What Necessity is there, for the next Generation to tread all the rugged Paths of their Forefathers; if a smoother nearer Way is pointed out to them?

Nothing is desired of our Astronomer, c x o but what he can with great Ease comply with; the new Names he must learn, will soon save him more Time and Breath; by their Conciseness, and expressive Distinction; than they will cost him: and no one, that makes it his Business to teach proposes it reasonably, without proposing to share the Trouble with his Scholars.

The innocent, tho' offending Ba, Fa, c x x Ga, &c. are only 1, 2, 3, &c. in Longitude: and Tanba, &c. Tasba, &c. 1, &c. in North and South Latitude: they are very easy to learn, and to be remember'd when learn'd.

By the Cloves, the Boys count the Minutes of the astral Day; and their Longitude: and by the Rings, the Declination of the Sun; and their Latitude: and by the Cards, which have place amongst both; their Locitude: which is Longitude and Latitude together.

If therefore some skillful Astronomer c x o teaches them readily and exactly to find their Zenith and the elevated Pole, and to point out the Stars in the Heavens as they find them

them in their Table and on their Globe; they will soon be fit for Sea: where they know how to apply their Ba, Fa, &c. so as to help them in any Trade or Business; it may there be found necessary to employ them in: Numbers Measures and Weights, being all (tho' not equally, nor all to each) applicable; to every Branch of Mathematicks: as well as to Astronomy; Geography and Navigation.

c x x The Generality of them, must be poor Boys; whose Business there, will be hard Labour: to which, hard Study is no good Preparative; and both together an unsupportable Burthen: it would (therefore) be uncharitable; and even unjust; to refuse teaching them as much Astronomy and of every other Science as is necessary to their Purpose: by the easiest Methods possible.

c x : It would not however, surprise me; to hear some from amongst the most learn'd (with great Gravity and seeming Authority) say, teaching Astronomy by these poor Monosyllables; is downright absurd: it is a noble Science, and ought not to be robb'd of the Ornaments Antiquity has bestowed upon it; then, with much Eloquence; recount to them, the History of all the Constellations: shew them a celestial Globe, where they are all represented in fine Colours: point them out some noted Star, whose Name and History they have already been told: count to them its Longitude and Latitude, and proceeding to give its right Ascension and Declination; wake them out of their long Dream of Attention.

For;

For, it is natural to imagine; that the Boys finding a Declination of the Stars to be counted from the Equator; will all immediately know it to be their parallel Latitude: and overjoyed, take their Star-Table; there finds its Name, and from thence trace the whole Ring of Latitude, and the Remainder of the Clove of Longitude it is upon: naming all the Stars they find in each, by the Names found in their Tables; thereby, becoming as unintelligible to their charitable Instructor; as he has hitherto been to them.

They certainly ought to thank him, for all the fine Stories told them; but as there is nothing in any of them to their Purpose, they can have no occasion to remember them.

As to the Figures, of the Constellations; they neither fit their Cloves, Rings, nor Cards; the latter of which, containing lesser Cards, of Minutes, Seconds, &c. seem very convenient Deposits for the Stars: whose Place, we always find distinguished; by Minutes and Seconds, &c.

And for the Stars, found in them; why should they be obliged to distinguish them by any other Names, but these expressing their Locitude? since any other, must have either these or some Equivalent added to them; for that Purpose.

And as for the Ornaments, Antiquity has bestowed upon Astronomy; let them all remain safe, and honoured in the Studies and Observatories of those that are learn'd in them: but let (at least) these poor Sea Boys, be taught to count their Time; and consequently

- quently, know their Place ; by the simplest Means, and the clearest Direction ; possible.
- C : . x And since we have no Names more easy concise or expressive than these poor Ba, Fa, &c. which, by counting all our Time and the Longitude from ; naturally direct us to, the Center of all our Hopes as Christians : (that, when exposed to the utmost Danger ; and even sinking, to rise no more in this World ; all may remind us, we have a Hope beyond it :) why not by them ?
- C : . : Rejected by the Learned, let them (without being dejected ;) take their Tables, and diligently compare them with the Globe ; which all are supposed (at least) to have Access to : where, it will be easy for them to point out ; and from their Tables, name every Star ; by the Name of the Card it is placed in : as those Cards, have Place in the first, second, third, &c. Clove of Longitude ; and the first, second, or third, &c. Ring of Latitude : and accustoming themselves to a ready Repetition of their Names ; as they point the Stars in each : they will soon become so well acquainted with the Phenomenon of this Representation of the Heavens ; as to be able, on any accidental View of the Heavens in a Star-light Night ; to name, and consequently give the Place ; of many Stars they will there see.
- C : . O Every one of which, carries a Clew to all the rest ; able to bring us through this Labyrinth we must else have found very perplexing : For, every Star, may now be traced ; in the Clove and in the Ring ; the Card it is found in, makes a Part of : and so on, till all are named ; their Places, being
all

all more particularly distinguishable; as placed in some one of the Cards, of the next lower Denomination: contained in this, &c. as may be found in our Star-Table.

Knowing the Stars, in each Clove and in each Ring; must enable us always to determine exactly the Place of the elevated Pole.

But the Determination of our Zenith (to that Exactness it appears to me necessary to know it;) is what I confess, I (without imagining it to be an Impossibility) apprehend to be, the most formidable Difficulty in our whole Undertaking.

However, no Boy seems to me properly qualified to be put on Ship-board; that cannot, in a Star-light Night, on an open Plain at Land; readily point out, the Place of the elevated Pole and their proper Zenith: trace so much of any Clove or Ring, as they find visible in the celestial Hemisphere they are placed under; and by its Cloves, count the Minutes &c. of astral Time; and thence know, how to correct their astral Watch: determine the solar Time, proper to the Place where they are; and that of, any other Place pointed out to them; on the Dial-plate of their astral Watch.

In order therefore, to determine this so important a Point; they must at first, choose a Time when the Heaven is full of Stars.

And then, a Number of Boys coming out together; without any other Director but their Tables; may not improperly be cautioned, not to expect; that if they disperse a little, every one of them may find a different Star over their Heads: but consider, that tho' we have more than 3000 Stars;

I

we

we have 1,036,800 several Cards, or Deposits ready to receive them.

- .1. That the celestial Horizon, by reason of its Distance and Height; shews us within it near the whole Hemisphere: or half of the celestial Globe, containing above 500,000 Cards: whilst the terrestrial Horizon, (the Center of which is the Place we are directly upon) is only that Part of the Earth, we can see round us; before the Heavens and the Earth seem to meet: which on plain Ground, generally exceeds not; a Circle whose Radius is three Miles.
- .10 To find therefore, the celestial Zenithal to it; (which must always have the same Form and Dimension both in absolute and relative Measure; as its terrestrial Parallel:) we must recollect, the Latitude of the Place we are in; for tho' the celestial Cloves of Longitude, are all constantly moving Westward; and so change their Place continually: yet the Rings of Latitude, all make their Revolutions without ever quitting their proper Circles in the Heavens; which are always, all zenithal to the terrestrial Rings that are their proper Parallels.
- .1x If therefore, their Latitude, when they begin to trace Stars, be 51 one half; they must not seek their Zenith far from it: but knowing the Place of the elevated Pole, measure 38 one half Degrees from it directly towards the Equator; exactly upon the Meridian, then zenithal to the Place they are in: which they may easily compute, from the Time of the solar Day; and their *Betlehem* Tables.

As

As by this means, they will be secure. 1 ;
from random Guesſes, Care and Cuſtom it
is hoped will ſoon make them perfect.

And if they know the exact Longitude. 1 0
and Latitude of the Place they are in, (as
Boys at firſt always ought to do) from any
one Star known, their Zenith may be deter-
mined ; it being always to be found, in the
celeſtial Ring of Latitude which is the pro-
per Parallel to the terreſtrial one we are upon:
and in the Clove of Longitude, counting the
preſent Minute of the aſtral Day: to the
terreſtrial Clove we alſo are upon.

And a conſtant, attentive Regard ; to. 1 ✕
their Zenith ſo found: muſt in Time, make
it ſo habitual to them ; as to be able readily
to find it, in any Place.

But it muſt be remember'd, that it is more. 1 ::
than 300 to one that the Card zenithal has
no Star upon it: but every known Star, be
it in what Part of the Heavens ſoever ; ſerves
(here) as an Index to the whole: all being
now ranged, in Ranks and Files ; with In-
tention to prevent Confuſion.

The two important Points, of the eleva- . Δ 1
ted Pole and the Zenith ; being exactly de-
termined: the firſt, muſt be conſidered ; as
conſtantly fixed in the North, on this Side of
the Equator ; and in the South, on the other:
and the laſt, as continually changing its
Longitude ; with our Time : and its Lon-
gitude, its Latitude, or both: as we change
our Place.

And in all Situations, the Boys muſt be. Δ Δ
made to obſerve ; how much of each Clove,
and how many whole Rings, are viſible in
their Hemisphere: or conſpicious to them.

ΔC Tracing Cloves and Rings, and consequently forming Cards; must be considered as etching in long plain and in curved Lines and Circles: which tho' difficult at first; soon becomes easy by Practice.

Δ. Thus, in tracing the Stars; tracing Ba, must be considered as drawing a Meridian; between the last Clove Macodo, and the first Ba: naming all the Stars we find upon Ba; that is, all within one quarter of a Degree, East of the Line we are drawing: only by the Name of the Card they are found upon, with the preceding Addition of A, E, I, O, U, or Y; to signify the Magnitude of the Star there found: tracing Fa, as drawing a Meridian, between the first Clove of Longitude Ba, and the second Fa, &c.

ΔO Tracing Rings, they must consider as drawing whole Circles round the Poles; as therefore our Latitude (South or North) is counted from the Equator, under an elevated Pole; we must always first distinguish the Place of the Pole itself: (which tho' but a Point, is supposed to contain the whole Circle Tancidua; or that of Tascidua;) naming the Stars (if we find any) within one quarter of a Degree of it; then drawing the Circle Tancidusa, or Tascidusa; names all the Stars, (if they have any) between it; and the next Circle: that is, upon the Rings Tancidusa, or Tascidusa, &c. (when a Ring, has no Star upon it; its Name being always given alone.)

Δx An Idea of these similar Cloves, different Rings; and consequently different Cards, produced by these parallel, and perpendicular Etchings: may I think, be more strongly

ly imprinted in their Minds; by considering the Place of each Star, in the Card whose Name it takes; and the exact Form Dimension and Content, both in absolute and relative Measure; of that Card: all which, we have (to a sufficient Minuteness) distinguished in our Tables.

Perfect in this Lesson, by Land; let. Δ : them before they go to Sea, (to use themselves to the Effect of the Motion of the Water) essay it upon Ships at Anchor, Barges, Boats, &c. taking all Opportunities of rendering themselves expert.

Being thoroughly Masters, in this Sort of. Δ $\odot$ Astronomy; must certainly best qualify them to measure and mark the Earth: as has been proposed.

The zenithal Circle, duly observed; will. Δ $\times$ prevent their deviating from its terrestrial Parallel: as we are measuring the Equator, Tropicks, Polar Circles; or any Parallels to them: either by Sea or Land.

And the exact Place of the elevated Pole, Δ : (kept as our Point of View) be our best Direction upon the Colures, and all Meridians; the Revolutions of the Heavens not allowing us a constant Clove of Longitude, as we have a Ring of Latitude; to measure under.

It has been said above, that Astronomy. ϵ Γ and Cosmography (particularly as here reduced to a Parallel) mutually correct each other: and that Astronomy, seem'd at present greatly to have the Advantage.

But the terrestrial Equator, Tropick and Polar Circle; with the two Colures, all measured and mark'd by the Characters of Locitude

tude as has been propos'd, each at only one quarter of a Degree's Distance from each other: with other Characters of Locitude, fixed so as to express the Longitude and Latitude of Capitals, Sea-Ports, &c. artificial *Remoras* placed to direct Voyages, point out Dangers, offer Anchors; also telling the Locitude where they are found, the Measure of a Minute, Second, and a Third in Time: measured from every Character of Locitude, upon the four Meridians making the two Colures Westward; (except those placed also upon the Equator, the Tropicks, and the Polar Circles;) and all mark'd with the Characters expressing the Time so measured: and on such Circles, as are between the Equator and the Tropicks; the fourth, may also be added; which on the Equator is just five Inches; computing the Mile at 2000 Yards: the Scale will be poised, if not turned.

. c c. Especially, if Observatories are built; on the Equator exactly upon the equinoctial Points; and upon the solstitial Colures exactly upon its Intersections with the Tropicks and polar Circles; and directly upon the North and South Pole: or where, by a just and well-noticed Calculation; they may be of equivalent Service; from all which, so many obvious Eclaircissements; naturally occur: as must (I think) by a moderate Attention, determine all necessary Queries.

. c . Which, our astral Watch; as the natural Balance between them: will always enable us to adjust.

. c o. Its 24 Hours, being given exactly in the Time the Firmament (or revolving Sphere) makes its Revolutions; the Space any fix'd Star

Star measures whilst it gives 300 Beats, is its Minute: and 5, its Second; $\frac{1}{3}$ its Third; 12 Thirds of Time, answering only to one Beat: which twelve Thirds on the Equator measures 300 Yards: and on the Circles Tancidosa, only 48 Mindua's or 16 Inches.

When therefore, and where; we can distinctly remark the Progress of any Luminary, upon the Equator; or upon any of its parallel Circles of Latitude: we (by the Measure of its Fourth, Third, &c. of Time) may determine the Latitude of the Circle; (if it has any) and whether it has any or no: comparing them with those in our Tables, giving the absolute Measure, answering to the relative; proper to a right Sphere.

Remembering always, that the solar Minute (containing more absolute Time) counts more Beats than the astral: and the lunar, many more than the solar; tho' all measure the same Space: viz. the Longitude of a Clove in any Latitude.

Every Second of Time, (meaning astral or absolute Time; (the Rule by which we always measure all Time:) found in the Distance between the two little Suns, and the two little Moons, adding five Beats to the solar, and to the lunar Day; and every Minute, 300: which Distance, (being the Excess of the solar and of the lunar Day; above the astral:) divided by 1440, gives the Excess of that Day's Minutes; above the astral: as near, as their Inequality allows; without a farther Calculation.

Every Boy, intended for Sea; must therefore (in a Pocket Book) keep an exact daily Account of these Distances: and of the

Place, they find every moving Body in the Heavens in; as often as, tracing Stars or any other Occasion; gives them an Opportunity.

∴ By which Means, they will soon all become Masters of the Tables; answering to the Use of the common Tables of Equation; vouch'd by their own Experience: and of the Ephemerides, which (to make them of general Use) must always give the real not the apparent Place of the Planets; both in absolute and relative Measure: which real Place, may (I think) be took to the greatest Exactness; when the Planets are zenithal to the Place of Observation.

∴ It will no doubt be objected, that I have built too much upon two disputed Suppositions; (*viz.*) that the Earth is really a right Sphere; and that absolute Time, may be given by what I call an astral Watch or Clock; counting it, by a regular determin'd Number of Beats.

∴ Δ First, in answer to them both together; I am not conscious, to have built any Thing upon either; but what may stand: should they, (which I see no Reason to apprehend) both fail.

∴ c Directions, having already been given to determine the Form and Dimension of the Earth: and whether it be, or be not a right Sphere, to divide it into 1440 Cloves, 720 Rings, and consequently into 1,036,800 Cards: in order to count our Time, and know our Place upon it.

∴ And if I can have no Watch-wheels made, to give 18000 Beats in an Hour; 300, in a Minute,

Minute, and 5 in a Second; (the Impossibility of which I own I cannot comprehend) yet I know, I can have such as will give me 20000, in an Hour, 1000 in three Minutes; and 50 in nine Seconds: or 16000, in an Hour; 800, in three Minutes; and 40, in nine Seconds; which may answer my Intention, tho' not so well; as those proposed.

But, to answer particularly, first; any. . . O
Objection against the Supposition of the Earth's being a right Sphere: Authority, and Experience; seem strongly to plead for it.

Authority, in the Creator's Word; con- . . . x
tradicted, it is true; by many great Men: who however, allow it at its first Creation to have had that Form; but assert, it must be changed; in consequence of a Motion, which I own appears to me only an Imagination.

And Experience, by the Agreement of . . . :
our Astronomy; with this Supposition.

Then as to such as are made against the . . . O
Supposition; that Astral Clocks or Watches may be made to give absolute or astral Time and to count it by their Beats; no Works of any Creature, can pretend to be comparable to those of the Creator: as such, the Sun only gives solar; the Moon lunar; and the fix'd Stars by the Revolution of the Firmament (in which God has placed all the Luminaries) only, astral Time.

The first, is certainly best brought to our . . . &
Observation by Sun-dials; the second, by Moon-dials; and the third, by looking up to the Heavens; or down into some Mirror:

ror: of which more may be said in another Place.

∴. But as none of them, are constantly obvious to our Observation; we endeavour (in the Absence of our Infallibles) to count our Time, by Instruments; entirely artificial: (and which consequently must be fallible) till their Return.

○ An Infinite of these Instruments, have been made to give solar Time; all which give equal Days, equal Hours, equal Minutes; in equal Beats: yet we know; that all the Days, counted between each Equinox and each solstitial Point; are each of a several Length: each differently exceeding each other; and the astral Day: solar Days, are therefore, really unequal; the 24 Hours, in every solar Day; unequal: the 60 Minutes, in every solar Hour unequal; every Beat, counting a different Quantity of solar Time; because they all count the same Quantity of astral Time.

○△ No Instruments having yet been made, (at least that I know of) to give the different Beats, which might answer to these different Minutes, different Hours, and different Days; only the solar Day, computed at a Medium is what is expected from them all.

○ How they answer this Purpose, we cannot pretend competently to judge of in less than three Months: and scarcely allow a Judgment to be decisive, upon any Clock or Watch; till its 365 Days, 5 Hours, &c. have been compared with the whole Year; which is the only compleat Measure we have for solar Time: having only the common Equation-Tables, to determine the Length of

of every particular Day ; in that Time : given, as the Medium ; of that counted in our solar Days upon a Sun-dial.

And lunar Time, having yet no better . ○ . Helps for us to count it by ; must also submit to an Equation, and be computed at a Medium, if given alone.

But astral Time, having all its Days, Minutes, &c. equal ; wants no Equation : and its Measure is compleat, in the Revolution of the Firmament ; every Day, at all times of the Year ; and in all Parts of the World.

If therefore, an equated solar Time can . ○ × be given by Instruments ; our real, always equal astral Time certainly may.

And if it be really given, without varying above a Minute or two, in a Year ; by our solar Clocks and Watches : it is certainly not unreasonable to expect, absolute Time in astral ; without any Variation worth regarding : only to correct.

No Objection therefore can be made . ○ ○ against Clocks and Watches giving astral Time ; which is not (at least) as strong against those giving equated solar : yet it would be a bold Assertion, to pronounce them all useless.

And this Advantage, must be allowed to . ○ × every Watch and Clock made to give astral or absolute Time ; that it is easy, on their Dial-plates ; or from them ; to give solar or lunar Time : (I mean the real, not the equated Day, &c. of the Sun, and of the Moon,) whereas could we have Instruments made to give real solar and lunar Time, we could not thence have astral ; without the greatest Trouble imaginable in Calculation.

Cour

- ○ ∴ Counting the Beats, of a Clock or Watch, appears to me, the most distinct and easy Way to determine little Quantities of Time exactly: the lower therefore the Number of Beats divide, before they break into Fractions; the more useful the Instruments giving them must be.
- × 1 All our astral Watches and Clocks, are (therefore) proposed to have their Wheels so proportioned; as to be adapted to this Purpose.
- × Δ Which Wheels, if they could be made as our Water-Wheels are proposed (if possible) to be; of a Matter not subject to rot, rust, or wear out soon: must in a great Measure prevent the Inconveniences our Watches now suffer by Change of Climate.
- × c And for those, that are the Effect of Motion; as they are generally only making the Clock or Watch go faster: the Time they ought to give being constantly present to us; every Variation from it, must soon be determined; and may be easily corrected.
- × . Wherefore, without pretending to Infallibility; (which never can be the Property of any humane Invention:) counting absolute Time, and in it giving all other denominated Time; by the Beats, or (at least) by an Astral Clock or Watch; is here proposed, as a Method preferable to any now in use; to all the Purposes, Artificial Time-tellers serve.
- × ○ A third Objection, I think myself obliged to answer; is made against the Liberty I take to refuse my Assent to the solar System: now generally subscribed to, by all the Learned World.

I own,

I own, nothing appears to me more un-
reasonable; than the supposed Authority, of
such a Subscription: which is the strongest
Bar, that can possibly be invented; against
all Improvements.

Had this Authority, been always esteem'd,
thus sacred; as it at present is represented:
how could this solar System, have usurped
upon the *Ptolemaick*? once equally honour-
ed, by being received and subscribed to by
all the Learned World: tho' now (I really
believe) not subscrib'd to, by any one Per-
son in it.

But, tho' *Venus*; sometimes as our Morn-
ing Star, sometimes as our Evening Star;
and *Mercury*, as often as visible; both assert
their Course to be round the Sun, not round
the Earth; and thereby actually demonstrate
against the *Ptolemaick* System, yet that Phae-
nomenon proves not the Solar, being equally
applicable to that of *Tycho Brahe*, &c. who
in supposing the Earth, to be the Center of
the Universe; are supported by an Authori-
ty, infinitely above what Numbers can give
to the Assertors of the solar System.

The solar System, let it have what Credit
soever given it; and let as many great
Names as please, subscribe to it: remains
still, not only undemonstrated; but (I think)
undemonstrable.

As Atheism, is the Effect of a previous
Wish in the Atheist's Breast; that there
were no God: so this System, is the Effect
of an unreasonable Desire; to establish the
Belief of a Plurality of Worlds; a Propo-
sition, (how plausible soever; pretending to
give

give greater Glory to the Creator :) full of Ingratitude to God, and Danger to Man.

∴ The Plurality of Worlds, as asserted in the solar System; so naturally leads to the Assertion of an Infinity of Worlds: that I own, I cannot see it merits any better Treatment; than the Assertion of the World's Eternity.

∴ Δ Is a Reflection; that in Case the Sun was in the Center of the Universe, and the Earth moved in the Ecliptick; the Phænomenon (to the Inhabitants of the Earth) would be the same: as if the Earth was in the Center, and the Sun moved in the Ecliptick: (which gave Occasion, to a Supposition, beautiful whilst only such; and proposed by Mr. Fontenelle in his *Plurality of Worlds*, as an Amusement;) a sufficient Authority to build an Assertion upon that the Sun really is the Center of the Universe; and that the Earth does move in the Ecliptick: was it not, as it certainly is; directly contrary to the Account given us by the Creator himself: for was the Sun the Center, or placed in the Center of the Universe at rest; what Miracle in its standing still?

∴ C The History of the Creation, as given by *Moses*; abstracted from the infallible Authority, of its being the Word of God: certainly deserves more Credit, than the Writings of any other Author upon that Subject.

∴ If we consider him, educated as a Prince in all the Learning of the *Egyptians*; (at that Time esteemed the most learned People in the World :) not ignorant, of the Tradition of the *Jews*; (from whom, no doubt the

the *Egyptians* had their best Pretence to that Honour) and being 40 Years old, and thus qualified to make just Observations; obliged to wait 40 Years as a Shepherd, in the Desert of *Midian* with his Father-in-law *Jethro*; and again, 40 Years longer in the Wilderness with the Children of *Israel*; as their Guide, and as their Lawgiver: what greater Authority, has yet ever contradicted him; the Phænomenon, never determining any Thing against him?

But assuming his Character as an inspired. : O
Writer, God, by him tells us; He made the Sun, the Moon, and the Stars; and placed them in the Heavens: for Signs, and for Seasons; for Days, and for Years; to give Light upon the Earth, and to divide Light from Darkness.

What ungrateful Obstinacy, provokes us. : X
then to deny the consequent Obligations of so glorious Gifts; the Benefit of which, we constantly enjoy: and proudly imagine, that by asserting our own vain Conceits as Truths; we can add Honour to the Omnipotent?

However, the subscribing to, or refusing. : :
to subscribe to this System; is of no Consequence towards the Determination of our Longitude: the Phænomenon of all Systems being the same with Regard to the Inhabitants of the Earth; except that of the *Ptolemaick*, which (I verily believe) has not now; one Subscriber upon it.

And, as to the Inhabitants of the Moon. : O
&c. I know not that they are, much less what they are; and therefore, concern not myself with Effects there; or Consequences to them: seeing no Reason, to take any of them

them for my Neighbours; (in the most extended Sense of the Word:) This we know, that the dark Regions of the Air are inhabited; and that their Prince, is the Enemy of Mankind.

∴× **W** An Idea, of the Effect; of such a Delineation, and Division of both Spheres as has been proposed; may (I think) easily be given even to Children, by making them observe an Orange as a Sphere: and its Stalk, and the little Speck opposite to it; as its South and North Poles: through both which, a Needle being put; they may in it, be shewn the Axis of that Sphere.

∴• Then peeling it, they may be shewn the natural Delineations upon it; which part it into Cloves: and afterwards really parting it, they may be made to see in those well-known Cloves (before they be suffered to eat them) the Cloves of Longitude proper to their Sphere.

•• They may also be taught, themselves to peel Oranges: part them into Cloves, count them; and mark them all 1, 2, 3, &c. then to put them all together again; each in its proper Place, to make again a whole Sphere: and be made to observe how all the Cloves contract, and join in each Pole; growing broader, in the Middle of the Orange; where, they must be told the Equator of their Sphere is.

••Δ This Equator, may more particularly be shewn them; by cutting an Orange exactly in the Middle cross all the Cloves: and shewing them, one Half of the Orange as the North and the other as the South Hemisphere;

misphere; that having the Stalk of the Orange in its Center, (always representing the South Pole) representing the South Hemisphere; and that having the opposite Speck, (which always expresses the North Pole) in its Center, representing the North Hemisphere.

They may also then be told, that if instead of dividing their Orange in its Equator; they had cut it exactly in two through each Pole: they would have had, instead of a North and South; an East and West Hemisphere.

They may then measure the Distances between their Equator and either Pole; and dividing it exactly into three, cut the North and South Hemispheres each into 3 Slices; which they must be taught to call their 3 North and 3 South Rings of Latitude: and be made to observe, how they lessen as they decline from the Equator to each Pole; by being compos'd of the narrower Parts of the same Number of Cloves.

The Reason of dividing these Orange Hemispheres into 3 Slices, and no more; is because the Orange Sphere, is supposed to contain 12 Cloves and no more; the Number of Cloves, being always double to the whole Number of Rings, North and South: the 12 Cloves being divided from each other by Semi-circles; which they must be taught to call Meridians: and the 6 Rings, by whole Circles; or a Point, as at the Poles; of every Sphere.

The North and South Hemispheres, therefore of our Orange Spheres; consist of 3 Rings and 12 Semi-Cloves; and the

K

East

East and West Hemisphere, of six Cloves and six half Rings: the Hemisphere being denominated East and West, as it contains the East or West Side of the 6 Rings of Latitude.

∴ ∅: More strongly to imprint, the Effect of such Divisions; another Orange may be given them, having the Equator, with its two North and two South Parallels dividing the 6 Rings of Latitude from each other; and the 12 Meridians dividing also the 12 Cloves of Longitude from each other: all mark'd upon it in white Lines, made by the Infection and taking of narrow Shreads off the yellow Rind of the Orange Peel: by which Means also, the 2 Poles may be mark'd; by two white Spots.

∴ ∅ ∅ On the Surface of this Orange, they must be made to observe; how the 12 Meridians, parting the 12 Cloves of Longitude; and the Circles parting 6 Rings of Latitude, intersecting each other at right Angles: cut it, into 6 times 12; or 72 Cards: which Cards, it may be remark'd to them; all spread at the Top, and contract at the Bottom; as if held in hand of that Pole, they take the Denomination of their Latitude from.

∴ ∅ × They must also be made to observe, the different Shape of each Card upon every Semi-Clove: and the exact Resemblance, of all the Semi-Cloves to each other; from the Similitude, of every Card upon the same Ring; or counting the same Latitude, North or South.

∴ ∅: Here, if the Children be big enough; the Distinction of Absolute and Relative Measure may properly be explained to them; and

and how the first measures Bulk, Quantity, and Space: whilst the later, counts Time; and the similar Parts of any determin'd denominated Quantity of Space or Matter, as the Degree, of a Circle; the Minute, of the Degree, &c.

Whence, they will find; that how much. ✕ 1
soever their Cards may (in several Degrees, &c. of Latitude) differ in Absolute Measure; yet in Relative, they are all right-angled Squares; whose Root, is 30 Degrees: and that their Cloves, count each two Hours of Time; upon their Orange World.

If they are now acute enough dextrously. ✕ 2
to take off their yellow Cards, and peeling their Orange mark all their Meridians Circles and the two Poles with a Pen and Ink as the Peel was mark'd by the Infections.

By the Cloves of this Orange, (which. ✕ 3
must be put upon a Needle like a Terrestrial Globe upon its Axis;) they must be taught to count their Longitude Eastward, and their Time Westward; from the first Meridian: which may be distinguished from the others, by a double black Line; placed so, as that the first Part of it falls exactly between the last and the first Clove of Longitude; and the second clove to but East of it (upon the Edge of the first Clove:) which first Clove, may be distinguish'd from the rest; by having a Patch or Patches upon it.

By its Rings, their Latitude; from the. ✕ 4
Equator to each Pole.

And by its Cards, their Locitude; or. ✕ 5
Place in Longitude and Latitude.

✕ ✕ After which if they can contrive to put their yellow Cards all together again, and place them over their Orange : moveable at Pleasure, upon the same Needle their Orange is fixt ; it will, so, represent the Firmament or revolving Sphere : as the Orange does the Earth, both upon the same Axis.

✕ ✕ The Revolution of this Firmament, they must be told is our Astral Day ; so called, because its every Part is distinguished by the different Numbers, Magnitudes, and Disposition of the Stars ; in all its several Cloves of Longitude.

✕ ✕ These astral Days, they must be taught to count ; by taking away one of the Cloves from the Orange Peel, and calling this Vacancy the first Celestial Clove of Longitude : which in its perpetual Motion Westward, must constantly become totally zenithal to its proper Parallel ; (the first Terrestrial Clove of Longitude, or patch'd Clove) at the Commencement of every Astral Day.

✕ ✕ When they have learned all this, and are desirous to go on ; the Peel of a whole Orange, may be so delineated for them, as to express distinctly (in white Lines as above) the Equators, the Tropicks, and the Polar Circles ; the Equinoctial and Solstitial Colures, and the Ecliptick.

✕ ✕ Whence, it will be easy to make them comprehend ; how, the Sun moving from West to East (tho' irregularly) in the Ecliptick ; (which they must be told is its proper Orbit ;) retards its direct Course Westward, with and in the Firmament ; and consequently,

ly, makes its Day longer than the Astral Day.

: And how, by declining North and South. :: 1
from the Equator; and returning to it again: it gives Summer and Winter, at the same Time; to different Parts of the World: and at different Times, to the same Place; whilst by the daily Rotation of the Firmament; it gives Day and Night to every Place that then has both; which they may soon be taught to know, depends upon the Sun's Place in the Ecliptick; easily brought to their Observation: and explain'd to them, by a Wire Ring; made to fit their Orange like a Colure.

In joining the Ends of this Wire, to make. :: Δ
it into a Ring; a sort of a Knot must be made to represent the Sun: and the Ring so made, must be divided into two equal Parts; one of which, must be wrap'd with white Thread or Silk; and the other with black: to represent Noon and Midnight; which are always upon the two opposite Parts; of the same great Circle; which like the Colures, cut through each Pole; and divide the Equator at right Angles: the Knot representing the Sun, being always placed in the Middle of the white half of the Ring; which always marks the Meridian, which (by being zenithal) gives Noon; as its Opposite does Midnight: a Phenomenon, which certainly merits much more Attention; than has hitherto been given it.

This Knot, representing the Sun; being. :: c
moved all along in the Ecliptick mark'd upon the Orange: whilst the Ring; is so held

as to be an exact Parallel to the Celestial Equator; that is, so as to make right Angles with the Equator, Tropicks, and Polar Circles: the White and Black Parts of the Ring will shew us, to what Part of the World it gives Summer and Day; and where it is Winter and Night, throughout its whole Course in this Ecliptick.

∴ When the Knot, representing the Sun; is exactly upon the Equator: the white Part of the Ring giving Noon, then reaching from Pole to Pole upon the Meridian the Sun is upon; and the Black always giving Midnight, from Pole to Pole on the Meridian opposite to it: and consequently, the Firmament (containing the Sun's Orbit) by its daily Revolutions upon that Axis, which now, (when each Pole, is exactly 90 Degrees from the Center of the Sun in the Equator) itself parts; Meridian Light from Midnight Darkness; Day and Night, are equally distributed to all the World; even Days and Nights, equal to each other; as they always are upon the Equator.

∴ ○ But when the Sun is in any other Part of the Ecliptick, (they must be made to observe) this Axis does not part Light from Darkness; but that, immediately after the Equinox; one Pole enters the Light, under the white Part of the Ring; and the other Darkness, under the black: and consequently, the one Pole being surrounded by meridian Light; the Revolution of the Firmament can give it no Night: and the other, being surrounded by midnight Darkness;

ness; the same Revolution can give it no Day.

And how, this constant Day at one Pole. ∴ x
and constant Night at the other; advances
from the Poles, to the Polar Circles; whilst
the Sun (moving in the Ecliptick) declines
from the Equator, to the Tropicks; and
falls back again to the Poles, as the Sun re-
turns to the Equator: the Axis of the
World, (represented by the Needle on which
the Orange is fix'd) becoming again the
Boundary of Light and Darkness: and Day,
and Night equal, not only on the Equator
(where it is always so) but on every Circle
of Latitude, from it to each Pole.

The bigger Children, may (here) be ∴ ∴
shewn the different Advances the Sun
makes, in the Ecliptick and on the Equator;
and be told the Occasion of them: and also,
that these different Advances in the Equa-
tor; occasion the different Excesses, of each
different solar Day above the astral,

Much more, might easily be explained to ∴ ∴
them in this Sphere: (or rather in an arti-
ficial Orange made to part into all these Di-
visions and receive all these Motions) as the
Course of the Moon, the Precession of the
Equinoxes; &c. But having gone so far, it
is hoped they may deserve a better; such as
has been described, and proposed for the
Use of Sea Boys.

Playing Cards, may also (I think) be made. ∴ ∴
to instruct and divert at the same time: as
suppose first, a Pack with only 8 Cards;
each Card having one Corap of the Celcora,
on the one Side; and its Parallel Terco-
ra, on the other: by seeing one Side of

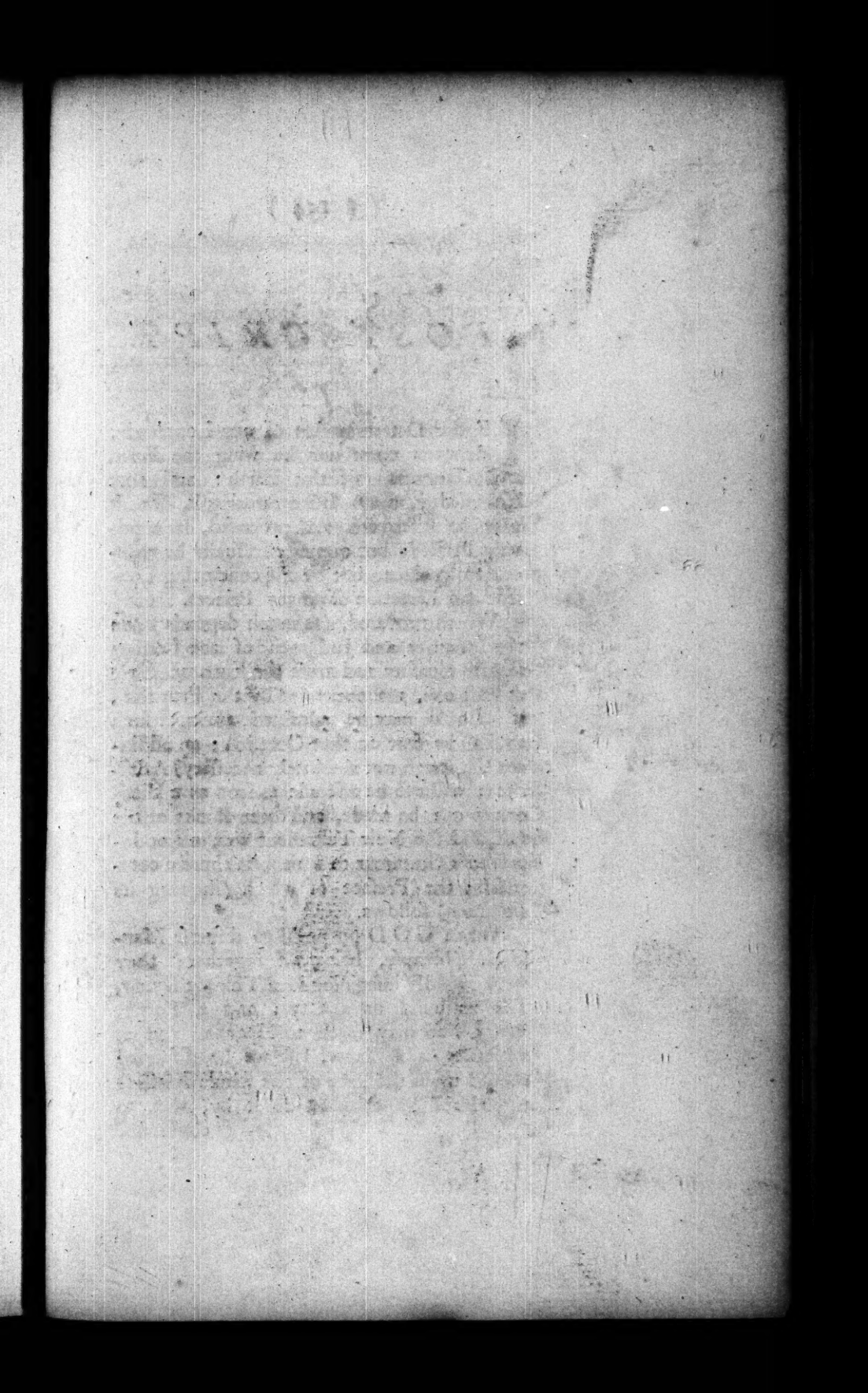
which, they must endeavour to describe the other.

∴ ∴ ∴ Another, with 24 Cards; each Card having upon it a Clove of Longitude, counting an Hour in Time: one Side always representing a celestial Card, and the other its proper terrestrial Parallel; (each whole Pack of Cards, always containing the whole celestial and the whole terrestrial Sphere;) from which they may be taught to know: and (having always, at least two Packs of the same Cards) describe, the Situation of the Heavens, in regard to the Earth; at any given astral Time: or at any solar Time, proper to any named Place: &c.

○ 11 Playing Cubes, (having all their 6 Sides painted with the Colours proper to their Liveries; as Longitude, Latitude, and Longitude, the Characters determining each; being always placed on the two Sides of each several Denomination: and the Top, the East, and the North Sides; distinguish'd from the Bottom, the West and the South Sides; by having a Label placed over the Character delineated upon them) may also be of Use: but scarce to Children, excepting such as are intended to be Apprentices to Statuaries, &c.

F I N I S.

POST-



POSTSCRIPT.

IF the Determination of our Longitude, depends upon our knowing the Form and Dimension of the Earth: and that Knowledge, upon first measuring it, &c. it may be discovered and proposed, by a private Person; but cannot effectually be reduced to Practice, but by the concurring Consent and Direction of many Princes.

Which procured, (as much depends upon the Integrity and Judgment of the Persons sent to measure and mark the Equator, &c.) at least one, recommended by the Proposer; it is hop'd may be admitted amongst such as shall be sent on that Occasion: an additional, (though not absolutely necessary) Assistance; will also be offered: as soon as a Dictionary can be made, and some Books of the Old and the New Testament writ in Lac-Infanta; a Grammar to which, is already composed; the Preface of which (shewing its Intention) follows.

When GOD purpos'd to disperse Mankind, (because, being all together; they were proudly imagining vain Things: saying, Let us build us a City; and a Tower, whose Top may reach to Heaven; and let us make us a Name, lest we be dispersed abroad upon the Face of the whole Earth:) the Means he chose to do it by, was, to confound,

confound; the one Language; which alone, was then spoke by them all: so that, being no longer able to understand each other's Speech; their joint Design perished.

Unexpectedly dispersed, by the Terror of so extraordinary an Event; they soon found, their Confusion proceeded from, the instant Introduction of a Variety of Languages: of which, each Person understood but one.

Whence, all gladly flying from those they understood not; with those they understood: soon thankfully submit to the Appointment of G O D, allotting to each; their several separate Habitations: according to their Tongues, after their Families; in their Nations.

As neighbouring Nations, however, soon began to learn each other's Language: seems not, the Introduction of an equated solar Day; (which having no Being in Nature, has confounded the Account of our real Time both solar and astral; and thereby, render'd the Determination of our Longitude so difficult; as even to be accounted an Impossibility:) an Infatuation, permitted by G O D to prevent the reassembling of their proud Posterity at their Pleasure.

So long, therefore, as G O D has appointed the Discovery of the Longitude, to be treated as a Chimæra; (because, his Time, to give Mankind that Knowledge; is not yet come:) so long, probably, the equated solar Day; will remain the general Rule of Time: which, as such; appears to me an unsurmountable Obstacle in its Way.

But, may we not hope to see a Time; when the Gospel of CHRIST having been

been preach'd over the Face of the whole Earth: the Pant of every Heart, shall be his Glory ?

○ Then, may Mankind ; all safely visit and understand each other : when all are animated, by this one good Intention ; of uniting to love, serve and praise him.

✕ May not, an easy Method, to determine our Longitude ; and an easy Language, whereby all Mankind may understand each other ; recounting the Mercies of G O D, and the Glory of his Kingdom ; be sought, in a View ; of hastening the Coming of that Kingdom ?

∴ May we not, find the first ; in making the equated solar Day, resign its usurpt Office, as Ruler of Time ; to our real, tho' unequal solar ; and always equal astral Days : strictly computed, and diligently compared ? As has been propos'd in my Letters to the late Lord *Torrington*, &c. explaining a printed Proposal, I in *August* 1731 sent to every one of the Commissioners, constituted by Parliament to discover the Longitude (supposing them, really to have acted ; as such.)

△ And, seems not G O D, (even in the Confusion at *Babel*) himself ; to have preserved a Key to the latter : by having imprinted in all Mankind, a natural Idea ; of the same one Alphabet : still found common to them all ?

△ △ For tho' in different Languages ; the several Letters composing it have different Names and Characters : yet, each Consonant ; or determined Number, of determined Consonants : vary'd by each Vowel, or deter-

determin'd Number of determined Vowels; plac'd in the same Manner, have nearly the same Sound in all: so that, we can, by them, express every Syllable, of every Word; in every Language, Tongue, or Dialect; spoke upon the Face of the whole Earth.

And, tho' each Language, now boasts to have its own particular Grammar: yet all, in Noun Substantives; give the Names of all Things: whether they be Objects of the Senses, or only, of the Understanding. Δ C

In Noun Adjectives, all their several different Qualifications. Δ .

In Verbs, all Motion; whether active or passive: as referr'd, to all Persons and Things; and to Indefinites: at all Times, and in all Manners. Δ O

In Participles, the Motion itself; declinable, as a Noun and as a Verb: Δ x

And in the undeclin'd Adverbs, Conjunctions, Prepositions and Interjections; the Cases of Nouns, Moods and Tenses of Verbs: and all the intervening Locutions, and Accidents of Speech. Δ :

And thus, seem all to own the same Original; and strongly to assert, the Knowledge, if not the Use of Letters; to be older, than any Language; except that one; given to *Adam*, and his Posterity; before the Building of *Babel*: and the Use, if not the Knowledge; of Grammar: to have as old a Date. Δ O

From this one universal Alphabet, disposed in the simplest; but most distinct Manner: let us, therefore, seek Words: and from the most plain, and natural Idea of Δ x

of Things; Rules of Grammar: whereby, we may forme a Language; which aims at nothing but to be easily understood, not easily misunderstood; and to be expresseble, in concise Terms.

- Δ ∴ It is not intended, in it; to give the Name of any Person or Place, otherwise; than as it is writ by that Person, and in that Place; at the Time present: the Vowels a, e, i, o, and u; being always, all pronounced as in French; (because, now, the most generally receiv'd Pronunciation) that is, a, as in Papa; e, as in en; i, as in lui; o, as in amo, u, as in su; and y, as i, in *English*. The Consonants all in their most obvious and natural Manner (*viz.*) t, always as a t; and never as an s: and c rather as a k than as an s, &c.
- Δ 1 The Names of God the Father, our Lord Jesus Christ, and the Holy Ghost: all as in the Latin Old and New Testament, in the Nominative Case.
- Δ The Attributes of God, the Names of the Feasts and Fasts of the Church; its Sacraments and Ceremonies: nearly the same, as in the Roman Ritual.
- Δ The Names of the principal Species; of Plants, Insects, Fishes, Birds, Beasts, &c. retaining generally a Latin Derivation.
- Δ However, as this Language pretends not either to Elegance or Copiousness; but bounds its View, in being simply intelligible: it follows the Latin, no farther; than that Language affords an Eclaircissement, the most to its Purpose: but gives the Names of all Noun Substantives proper to it in Words ending in a; as Homa, a Man; Homa-

Homava, a Woman; Homava, an old Man; Homavava, an old Woman; Homaja, a young Man; Homavaja, a young Woman; Homavaja, an old Bachelor; Homavavaja, an old Maid: except some Distinction require another Termination.

Which Termination, must always express an Alteration in Number; or determine it, to be a compound Noun.

The Names of Numbers, Measures, and Weights; and also those expressing every distinct Part of Time and Place: are all the same, as are given in the Proposal to determine our Longitude, its Explanation; and the Table of Longitude: in all which, the most expressive; and most concise Distinction was attempted: not, without a View to Use here made of them.

The Compiling this Language, is not the Work, nor is it intended for the Use of the Learned; (who want it not) but for such unlearned, as may have occasion to visit every Climate, and every Meridian upon Earth: as, suppose, a Number of Youths taught Astronomy by the Method directed in the Proposal &c. as a Means to determine our Longitude: all, perfectly well acquainted, with the Nature of Absolute and Relative Time; Absolute and Relative Measure; and all their several Relations and References to each other: should be desirous to add, an experimental Cosmography to it; and thereby specify the Parallel between the Heavens and the Earth, as given in the Proposal; by measuring and marking the Latter, as is proposed in its Explanation: particularly, tho' not principally for theirs.

Be-

cō Because, their Undertaking naturally calls for such an Interpreter; or rather, such a Variety of Interpreters; as perhaps, the whole Learned World can scarce furnish them with.

c× But, if they all learn and speak; a Language: so easy, that they can with a very little Trouble; teach it to the Boys or Youth of every Place they make any stay in or care to take any Companions from: they may, in them find; not only, good Interpreters; but useful Hands.

c: If this Language answers the Intention of its Compiler, 'twill be of Use; if not, 'tis only the Loss of a little Time; and that, the Time of an Unlearned: not however, spent without Amusement at least; in an Attempt, (in spite of that Disadvantage) to be useful.

.i Such therefore, as it is; it is offer'd to all who want, or think they may be benefited by it.

.Δ And its distinguishing Characters, being; Facility and Simplicity; it is call'd Lac-Infanta, by its Author;

JANE SQUIRE.

THE

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 OF THE
 EXPLANATION
 OF A
 PROPOSAL

To DETERMINE our
 LONGITUDE.

By JANE SQUIRE.

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